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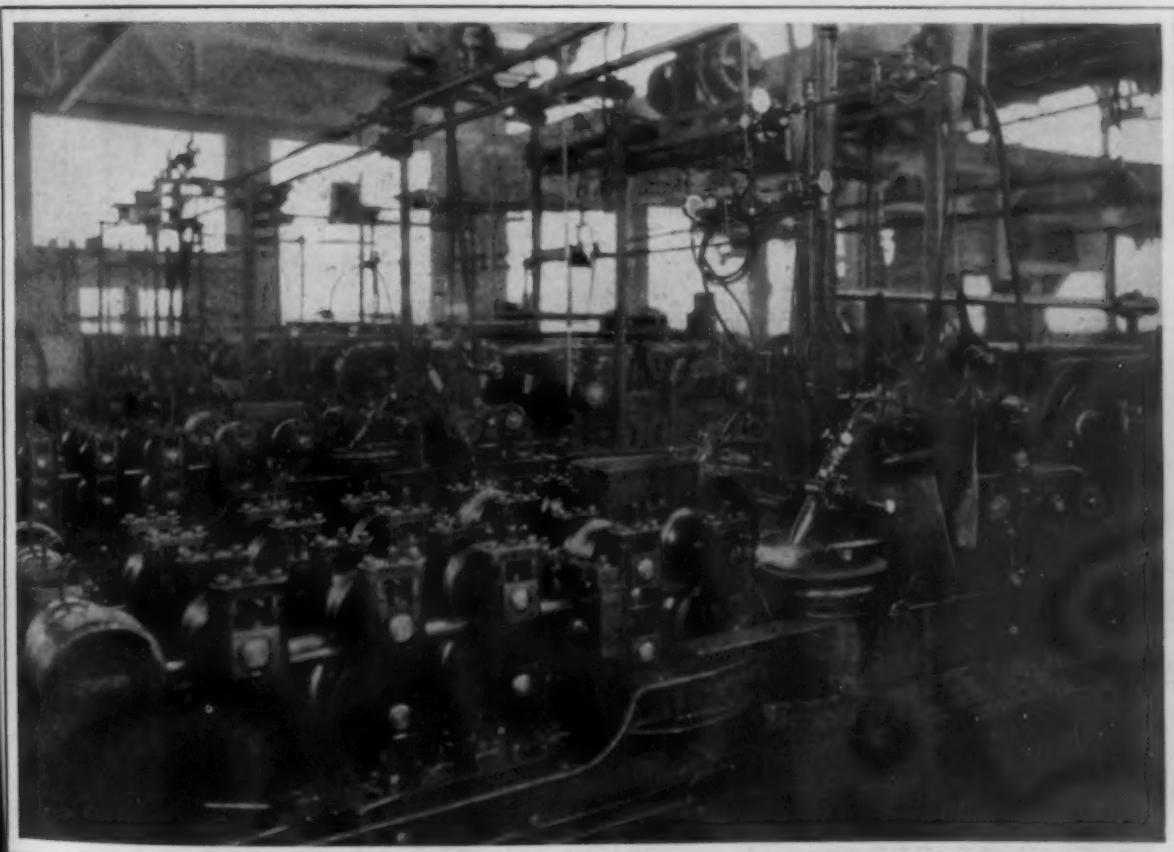
Autogenous Welding of Steel Tubing

New Process Adopted by Elyria Iron & Steel Company in Which Continuous Oxy-Acetylene Welding Machines are Used

THE autogenous welding of steel tubing has recently been successfully developed commercially by the Elyria Iron & Steel Company, Cleveland, Ohio, which has placed in operation a plant for the manufacture of light gage steel tubing by the oxy-acetylene process. Previous to the establishment of this plant the general practice has been to electrically weld light steel tubing. The oxy-acetylene welding of steel tubing has been made

length as it passes out of the machine in the form of finished product. By this method tubing can be made of any length. As the only physical strain put upon the steel in the process of making the tubing is that of forming it, no drawing, annealing or pickling is required to restore properties lost in the process of manufacture.

The strip steel stock as it first enters the machine from a coil passes through six sets of form-



View of the Front End of a Two-Unit Continuous Welding Machine Showing the Forming Rolls, Stationary Torch, and Under the Latter the Endless Chain Vise That Encircles a Cooling Chamber. At the Extreme Right is Shown the Endless Chain Pulling Device. Acetylene and Oxygen Lines Appear Above the Machine

practical by the development of a continuous tube welding machine which is automatic in operation. The machine is controlled by patents held by the company.

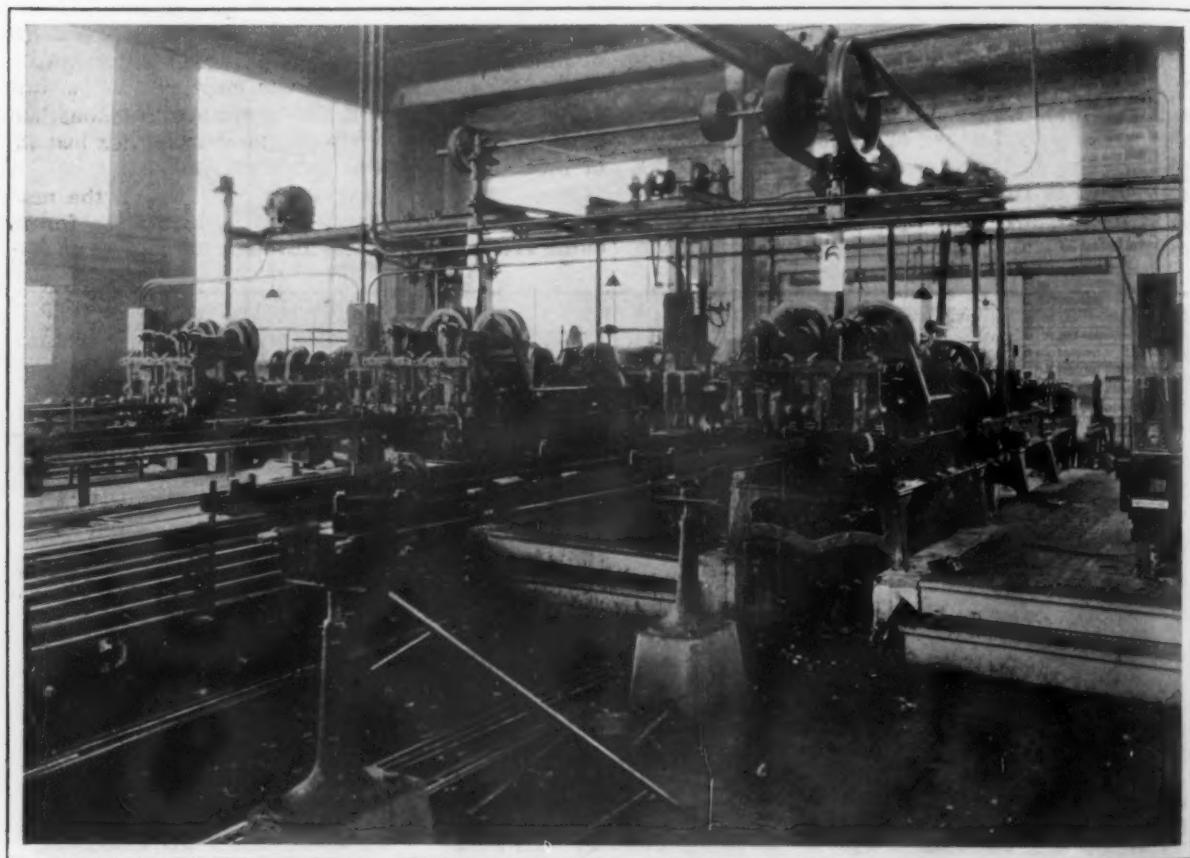
Strip steel enters the machine, is formed into tubing, welded by a stationary welding torch as it passes under the flame and is automatically cut to

ing rolls. On leaving the last set of rolls the tube is formed to shape, the two edges coming into close contact on the upper side but not overlapping. Just beyond the last set of rolls is located a fixed, continuous welding torch which welds the joint. The joint is fused without the use of wire or other filling material. While being welded the tube is

held in an adjustable welding vise composed of two endless chains that revolve as the tube passes through. The vise holds the edges of the joint firmly together until they have welded and cooled. The jaws of the vise are oval shaped and so formed that they bear on the sides of the tubing. They are sufficiently far apart not to interfere with the flame from the torch. No power is applied to the endless chain vise, its rotary motion being effected by the forward movement of the tubing which it grips. The vise revolves around an oval-shaped circulating-water chamber, and this cools the metal sufficiently to cause the weld to hold before the vise releases its grip. After leaving the vise the tube is further cooled by passing under a jet of water and the burr is then ground off the welded joint by a Norton grinding wheel which is a part of the machine. The tube then goes through three additional sets of rolls, these being for finishing to size and straightening. Between the grind-

hot rolled stock is used. The steel is from 16 to 20 gage inclusive, and the tubing is made in sizes from $\frac{1}{2}$ to 4 in. diameter. The stock is received in coils, and before being fed into the machine, seven or eight of these coils are welded together on a Toledo Electric Welder Company's welding machine, which also removes the flash, and the metal is re-coiled into a large coil, weighing about 2500 lb. The tubing is formed at the rate of from 3 to 10 ft. per minute, depending upon the size, and it is stated that the finished tubing comes from the machine within 0.003 to 0.004 in. of correct size, and that it is cut to length within an accuracy of $\frac{1}{32}$ in.

The welding machines are built in double independent units, and one or both units may be in operation at the same time. There are nine of these machines having a total capacity of 75,000 ft. of tubing per day. The machines are identical except that they have rolls of different sizes for forming



Read End of the Welding Machines Showing the Cut-off Troughs

ing wheel and the finishing rolls is an endless chain pulling device which grips the tube and keeps it moving at the proper speed while it is being formed and welded.

The finished tube runs on to a cut-off trough in which it is automatically cut to standard lengths or to specifications. After a section of tubing is cut off the trough automatically drops and allows the piece to roll off into the stock pile of finished tubing. The cutting is done by a shear blade, operated by a cam that is set in motion when the tubing, as it moves along the cut-off trough, comes in contact with a stop on this trough. The cutting device moves with the tubing a short distance during the cutting operation, and after cutting the tube it automatically moves back to its regular position on the machine.

The stock used for the manufacture of the tubing is mostly cold rolled strip steel, although some

the tubing in the range of sizes, it not being found practical to have sets of rolls of different sizes for use on one machine. From the main gas supply lines that enter the building oxygen is carried in a 1-in. line and acetylene in a 2-in. line over the machines. From these overhead lines the torches are supplied by $\frac{3}{8}$ -in. line. Individual electrical drive is provided for the welding machines by General Electric alternating current 440-volt motors, some of these motors being 5 and some 10 hp. A 3-ton Pawling & Harnischfeger electric crane with a runway across the building in front of the machines is provided for handling the strip steel.

The plant equipment includes Williams, White & Company bulldozers and Ferracute and Consolidated presses for bending, broaching, flattening and other fabricating work in connection with the tubing to meet commercial demands.

The company's oxygen plant is of unusual inter-



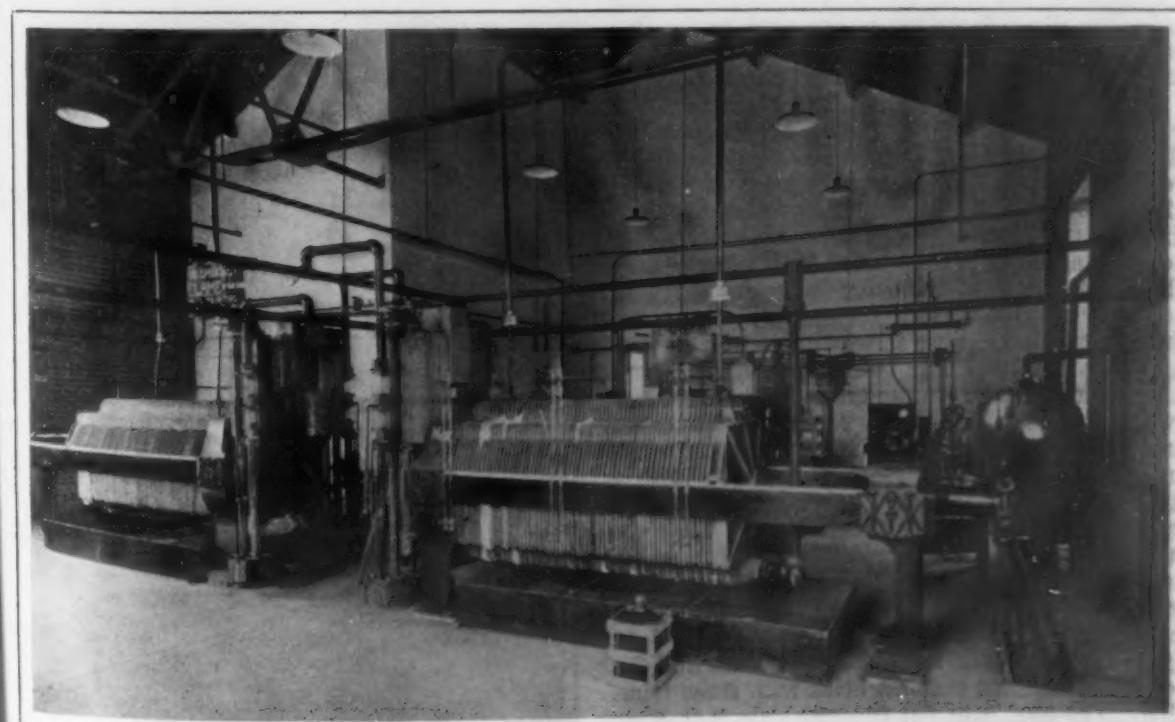
View of the Plant Taken from the Office at the Front. The Welding Machines Are Arranged in a Row Across the Back End of the Building

est as it represents the most modern practice in arrangement of a plant of this character, is designed for large production and is provided with a new type of electrolytic oxygen and hydrogen generator. As hydrogen is not required in the manufacturing processes this is a by-product with the company and is sold to other users.

The oxygen and hydrogen plant which is located about 150 ft. from the main factory building is equipped with two type L bipolar filter press electrolytic oxygen and hydrogen generators furnished by the International Oxygen Company. These are the first generators of this design built. A third generator of the same type and capacity is being installed. The advantage claimed for the bipolar generator is a much greater capacity and smaller space and with less current, a single generator having, it is claimed, a production capacity equivalent to 50 unit cells and using one-sixth as much floor space, making the installation of generators of this

type desirable where a large production is required and floor space is limited. Each generator occupies a floor space 15 by 5 ft. and is 8 ft. high. The type L generator installed, the larger of two sizes made, requires a direct current of 2 volts for each plate, and each machine, having 60 plates, requires 320 amp. at 120 volts. When operating at about 50 deg. C. with 28.9 per cent potassium hydrate solution, the machine, it is stated, will produce at least 150 cu. ft. of oxygen and 300 cu. ft. of hydrogen per hour and 4 cu. ft. of oxygen and 8 cu. ft. of hydrogen per kilowatt-hour. This means a daily capacity of 3600 cu. ft. of oxygen and 7200 cu. ft. of hydrogen. It is stated that the purity of the gases direct from the generator averages 99.6 per cent for the oxygen and 99.8 per cent for the hydrogen, so that a purifying medium is not required.

Oxygen and hydrogen are carried from the generators through a 2½-in. line to two gas holders of 15,000-cu. ft. capacity just outside the building



View in Generator Plant Showing Electrolytic Oxygen and Hydrogen Generators. Compressor Equipment in the Background

where the gases are kept under a pressure of 3 in. of water. The gas holders are 43 ft. diameter and approximately 26 ft. high, the bells being 40 ft. diameter and 13 ft. high. The holders were erected by the Cruse-Kemper Company, Ambler, Pa. The oxygen passes through an American Metal Company meter on the way to the holder. The hydrogen is not metered as it always is double the amount of the oxygen.

Electrical current for the generators is supplied by a General Electric 100-kw. direct-current generator set, the switches being so arranged that one generator can be operated singly or the two in series.

For charging cylinders with gas for use outside the plant there are installed in the generating room two air compressors. One of these is a Platt Iron Works three stage machine for charging oxygen, having a capacity of 12 cu. ft. per min. up to 2000-lb. pressure. For charging cylinders with hydrogen there is a Norwalk Iron Works compressor capable of delivering 15 cu. ft. of gas per min. at 2000 lb. pressure. There are two charging lines for charging cylinders, one for oxygen and the other for hydrogen. These each have a capacity of six cylinders at a time.

The oxygen supply for the factory is pumped from the large oxygen holder to two storage tanks on the opposite side of the generator building by means of a two-stage compressor furnished by the Hall Steam Pump Company, Pittsburgh, Pa., and capable of delivering 400 cu. ft. per min. at 300 lb. pressure. These tanks have a capacity of 5000 cu. ft. each at 300 lb. pressure. Automatic electrical control is provided to stop the pump when the pressure on the tank reaches 300 lb. and to start it when the pressure drops to 275 lb. In usual practice gas is being used from one tank while the other is being filled, but both tanks can be filled at the same time and gas can be taken from both at the same time. The gas is carried from the high pressure storage tank to the factory in a 2-in. underground line, the pressure being reduced to 50 lb. by a reducing valve at the tanks. The storage tanks are 20 ft. high and 4 ft. diameter. They were built by the John Wood Mfg. Company, Conshohocken, Pa. Acetylene is delivered to the factory building in a 2-in. underground line from the carbide plant located some distance away.

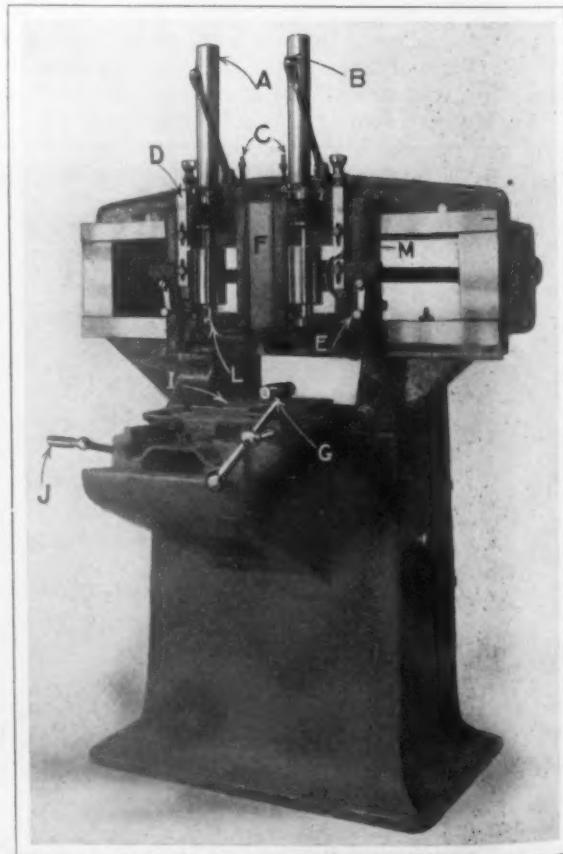
The main factory building is a steel frame and brick structure 381 ft. long and 110 ft. wide, to which an extension 117 by 71 ft. is now being erected for steel storage purposes. It is divided into three bays with a monitor bay in the center. The roof trusses are spaced 16 ft. on centers, but the building columns are spaced 32 ft. apart, every other center column being eliminated by carrying the center and side trusses on longitudinal girders. The end of the building in which the welding machines are located is built in the form of a transept in order to have the trusses erected cross-ways and provide a runway under the trusses for the crane that serves the machines. Another reason for the transept is that it can be extended to join with a parallel building when the growth of the business warrants the erection of another unit. The roof trusses rest on 30-in. brick pilasters, between which the sides of the building are of glass in Fenestra steel sash. The sash in the side walls is 12 ft. high and there is a continuous sash in the monitor 7 ft. high. The side walls are of common brick and the front is of selected common brick with stone trimming. The roof is of flat concrete slabs 2 ft. wide and 5 ft. long, the purlins carrying the slabs being 5 ft. apart. The roof slabs are covered with tar and

gravel roofing. The floor is built of 5 in. concrete slabs over which is laid 3-in. creosoted wood block flooring furnished by the Ohio Wood Preserving Company, Pittsburgh, Pa. Convenient toilet room facilities are provided on a mezzanine floor located in the roof trusses. The front of the factory building is a two-story structure used for office purposes. The oxygen and hydrogen generator building is 43 by 66½ ft., the acetylene building is 21 by 35 ft., and in addition there is a boiler house for heating purposes 36 by 28 ft. These smaller buildings are of brick and steel construction. The plant was designed by Ernest McGeorge, engineer, Cleveland, Ohio.

A Large Production Profiling Machine

The Newton Machine Tool Works, Inc., Philadelphia, Pa., has placed on the market a profile milling machine designed especially to turn out large quantities of accurate work rapidly. To insure exact duplication of work sets of gage strips are provided to control the movement of the cutters.

The spindles are mounted on separate slides having hand vertical adjustment and revolve in double taper bronze boxes, which can be adjusted from time to time to give accurate running fits. Each of the slides is poised on a stout spring mounted inside the cover A, which is relied upon to act as an automatic saddle return. The vertical movement of the slide is controlled by the lever B, the limit of movement being determined by the fixed and adjustable stops on the gage C. To enable parts having finished faces at one or more elevations to be duplicated, removable master gage strips D are employed. These have independent setups, and the latch E controls the various operating heights by engaging different notches in the strips. If desired, the



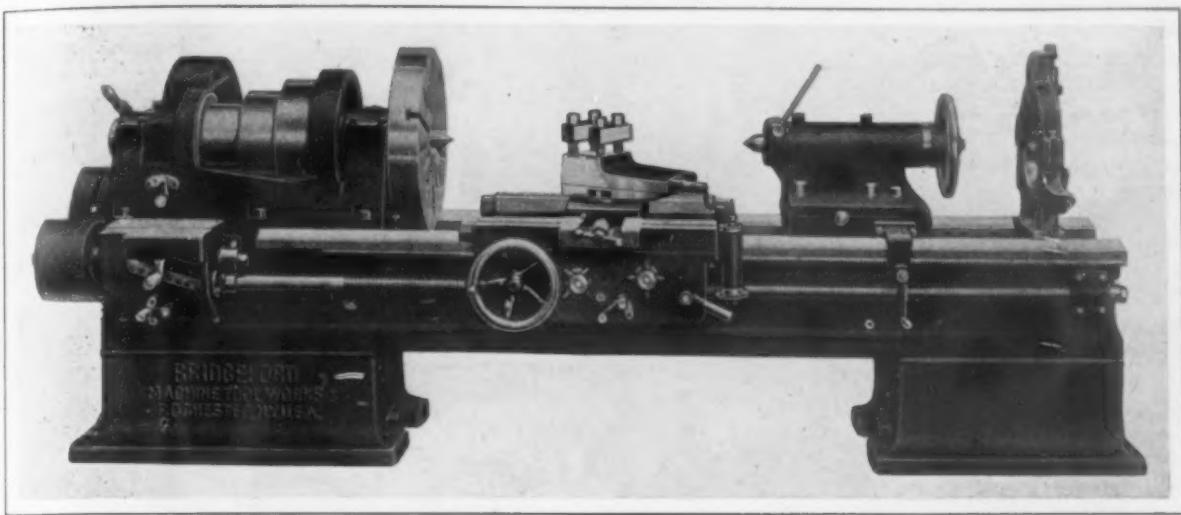
Profile Milling Machine Intended for the Rapid Production of Large Quantities of Work

spindle saddle may be held in a fixed position by the clamp *H*. The vertical adjustment provided for the spindles is $2\frac{1}{2}$ in. and the fixed distance between the spindle centers is 12 in.

The pilot is mounted on the duplex saddle *F*, and is guided across the master former by the hand

Heavy-Duty 26-In. Cone-Driven Lathe

The Bridgeford Machine Tool Works, Rochester, N. Y., has placed on the market an improved type of 26-in. heavy-duty cone pulley driven lathe. The changes include the use of a central rib to reinforce



A Heavy-Duty 26-In. Lathe Equipped with Cone-Pulley Drive and Special Means for Holding the Tailstock in Place

lever *G*, which controls the compound spur gears engaging the adjusting rack on the bottom of the saddle. The table *I*, which has a working surface measuring 12 by 15 in., has the work and the master former mounted upon it and is moved through compound gears controlled by the lever *J*. The maximum amount of movement of which the table is capable is $21\frac{1}{2}$ in. There are two T-slots provided for the work table, which is surrounded by a lubricant pan arranged with drains leading to a reservoir, mounted on the rear of the base. From this reservoir the lubricant is returned to the cutters by a pump which is operated in connection with a number of machines. The gears used for the table movement are of the spur type, and each of them is made in two cylindrical parts to enable any slight motion which might result from wear to be taken up by rotating one part and thus expanding the tooth.

The spindles are driven by continuous belts direct from the driving countershaft to the spindle sleeves *L*, the belts being guided by the sliding idle pulley *M*. Only two spindle speeds are provided, these being 840 and 1200 r.p.m.

The Phillips Sheet & Tin Plate Company of Weirton, W. Va., has placed with the Westinghouse Electric & Mfg. Company, East Pittsburgh, a contract covering the electrical equipment of its new mill now in process of erection. This company manufactures tin plate and cold-rolled strip steel. Less than a year ago the company purchased a 750-hp. motor for operating its tin mill, and upon deciding to erect the new mill electric drive was determined upon. The contract calls for two 3000-kw., 3-phase, 60-cycle, 6600-volt turboalternators; one 1500-hp. constant-speed alternating-current motor; one 2500-hp. adjustable-speed motor, and one 800-hp. adjustable-speed motor. The speed adjustment of about 50 per cent from high speed is obtained on the 2500-hp. and 800-hp. motors by means of direct-current synchronous control, a scheme devised and advocated by the Westinghouse engineers.

the bed, the redesigning of both the head and tail stocks, and the addition of a pawl at the rear of the tailstock which engages with a rack in the bed, and is relied upon to resist the strain when heavy cuts are being taken.

The headstock is provided with bronze bearings, those for the spindle being of the self-oiling type, and either a three or four step cone pulley is provided. The gears in the headstock, which are cut from the solid metal, are of the wide face coarse pitch type, and the back gear sleeve and pinion are a steel forging. High carbon steel, finished by grinding, is used for the spindle and the bearings are scraped to fit. A $2\frac{1}{8}$ -in. hole extends through the center.

The bed is both wide and deep and is reinforced by heavy box pattern cross ties. A rack, which is relied upon to keep the tailstock locked in position when heavy work is being done, is cast to form a part of the longitudinal reinforcing rib. The carriage, which has a bearing of $38\frac{1}{2}$ in. on the vees, together with the compound rest and apron, is of heavy construction. Independent frictions are provided for the lateral and cross feeds, and their direction is changed at the apron. The customary interlocking devices are provided to prevent the engagement of conflicting feeds.

The power is supplied through a 5-in. belt with the three-step cone pulley, or a 4-in. belt for a four-step pulley. Three different speeds are available for each step of the pulley, thus giving either nine or twelve spindle speeds, according to the number of steps on the cone driving pulley. If desired an adjustable-speed motor can be used for driving the lathe by substituting a sleeve and gearing for the cone pulley.

The equipment regularly furnished with the lathe includes large and small face plates, compound and center rests, standard change gears, a self-oiling countershaft, the necessary wrenches and either an American or English type tool post. Other equipment which can be furnished at an additional cost includes taper and quick change gear attachments, extra large center rests, a thread indicator and side turning and follower rests.

The National Transit Pump & Machine Company, Oil City, Pa., has established an agency at 30 Church Street, New York.

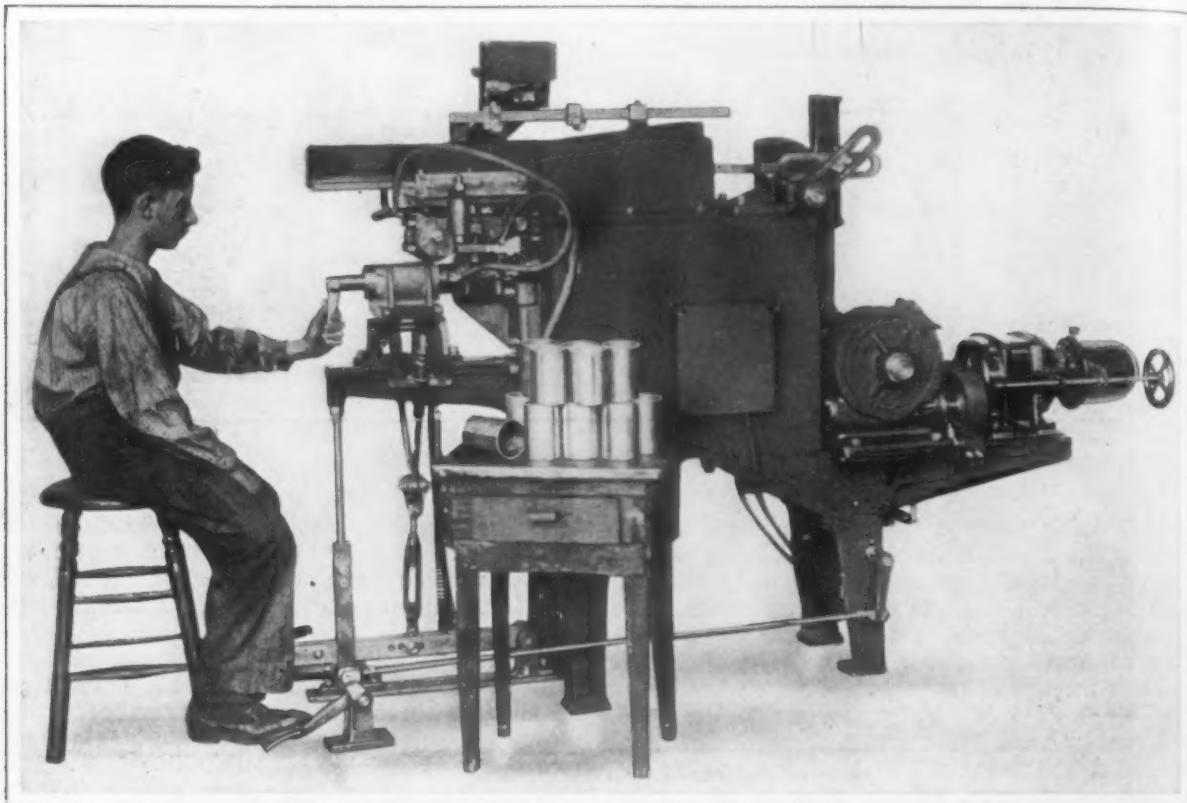
Electric Cylinder Seam Welding Machine

The Toledo Electric Welder Company, Cincinnati, Ohio, has placed on the market a new motor-driven machine for welding the seams in cylinders ranging from $2\frac{1}{4}$ to 4 in. in diameter and from 4 to 8 in. in length. Either sheet steel or lead-coated stock can be used, and a water and gas tight joint is aimed at, as well as one smooth and capable of being finished by enameling or any other process

50 in., while the distance from the floor to the center of the dies is 10 in. less. The maximum diameter of the die that can be handled is 5 in., and the travel of the upper die is between 5 and 9 in.

High-Duty Lathe of the Low-Swing Type

For turning diameters that are too small to be put in larger lathes, the Duff Mfg. Company, Pittsburgh, Pa., has recently placed on the market the



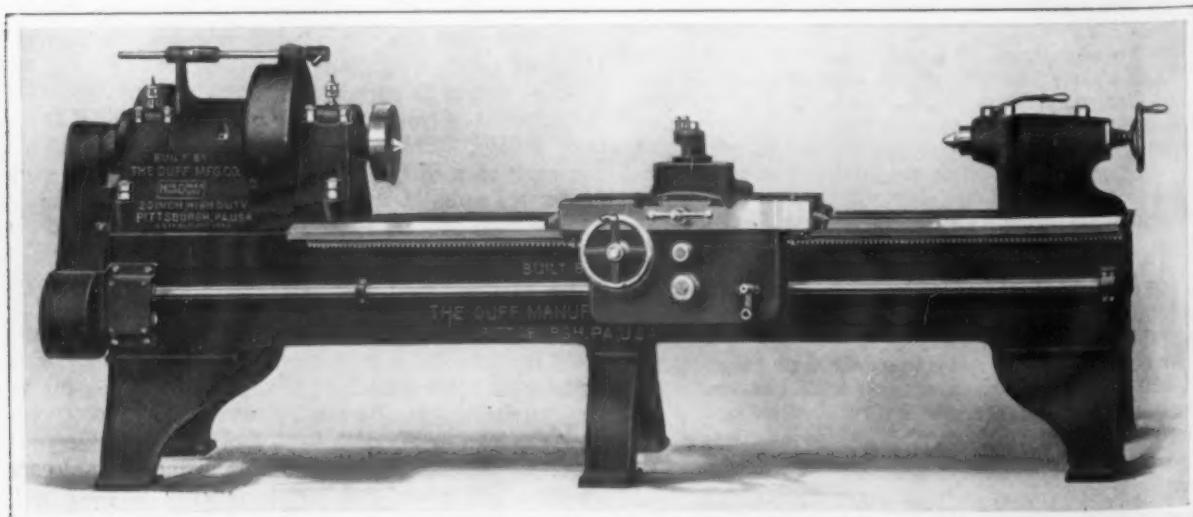
A Machine for Welding Electrically the Seams in Cylinders of Sheet Steel or Lead-Coated Stock

desired. The machine is designed so that it can be used for finishing articles that have been drawn to shape before the welding operation is performed, such as enameled coffee pots and burner cylinders for oil stoves or similar work. Where duplicate parts of the same dimensions are to be turned out a set of gages can be employed.

The machine is driven by a $\frac{1}{2}$ -hp. adjustable-speed motor and occupies a floor space measuring 16 x 70 in. The over-all height of the machine is

Hindman high-duty lathe. The swing over the saddle is 12 in., and emphasis is laid upon the fact that it is possible to turn any diameter from that figure down to the smallest at approximately the proper cutting speed. Another feature of the lathe is the variety of driving arrangements that can be secured, it being possible to use a gear drive, a silent chain drive or a group drive from a common lineshaft.

The bed, which is regularly furnished in a 10-ft.



A High-Duty Lathe Designed for Turning Work up to 12 In. in Diameter

length, is of the standard box type. The back is arranged so that any standard attachment, such as taper, back arm facing, etc., can be bolted in place. Heavy reinforcing is provided and the bed is arranged so that the motor can be bolted in place.

The spindle is a heat-treated, hammered forging, running in ground bearings. The diameter of the front bearing is 5 in. and the length is $7\frac{3}{8}$ in., while the dimensions for the rear one are $4\frac{1}{2}$ in. in diameter and 6 in. long. The main driving gear on the spindle is 18 in. in diameter, with a $3\frac{11}{16}$ -in. face, and is made from a forged and rolled Carnegie section. The pinion meshing with the gear is cut from a solid bar. Steel slip gears furnish three speed changes in ratios at 11 to 1, $14\frac{1}{4}$ to 1 and $18\frac{1}{4}$ to 1. The pinions of the change gears are all carbonized, heat treated and ground, and vanadium steel is employed for the smallest of the set. Five speed changes, ranging from 0.02 to 0.10 in. per revolution of the spindle, are provided by a similar set of slip gears, the difference between any two successive rates of speed being 0.02 in.

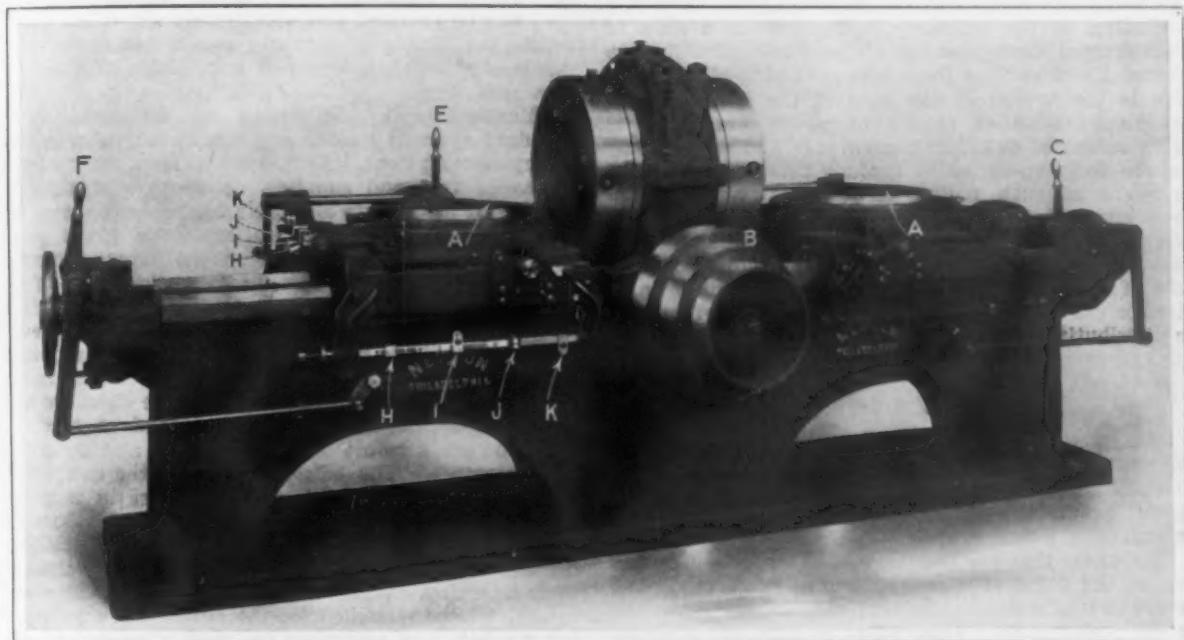
The apron is of the double wall type, equipped with a new reversing mechanism, in which all the

In a recent test of one of these lathes an 8-in. British high-explosive shell was rough turned at a cutting speed of 50 ft. per minute and a feed of 0.136 in. per revolution of the spindle. The time required for doing this work was 10 min. per shell.

Special Boring and Turning Machine

A special machine for boring, turning and facing the rear axle member has been designed and built by the Newton Machine Tool Works, Inc., Philadelphia, Pa., for a large Western automobile builder. The machine, in addition to performing its regular work, can also be used for trimming closed ends and removing the excess lengths from the open ends of shells up to 12 in. in diameter, as well as for contour boring of the interior under certain conditions.

Individual cross and longitudinal saddle feeds, with positive turret feed stops, are provided, the latter giving four positions for the longitudinal and two positions to the cross feed. The turrets A, which measure 18 in. in diameter on the working surface, have circular adjustment with six stations and are



A Special Combination Machine for Boring, Turning and Facing the Rear Axle Members of Automobiles

gears are constantly in mesh. The carriage is heavy, with wide ways and a large bridge. The tool rest, which is made from a steel casting, has a large top, thus providing the operator with a place to set the several tools that may be required for various operations on any given piece. The turret used with the lathe has large bearing surfaces on the shears and a revolving head and is operated by power in one direction only.

The drive is by tight and loose pulleys with a single belt from the main lineshaft, or if desired a two-speed countershaft can be used, thus giving two speed changes with one shifting of the gears. The loose pulley is mounted on roller bearings, which, it is emphasized, eliminates the necessity for constant oiling. If desired, motor drive can be used, the bed being arranged so that the motor may be bolted in place and the power transmitted by either gears or through a silent chain. The arrangement of the driving pulley also enables the motor to be bolted to the floor, or the lathe may be set up in groups and driven from a lineshaft located on the floor or in a pit.

arranged to carry removable tool holders of the Acme type, grooves being provided to care for the ready removal and attachment of the holders. A Horton three-jaw universal chuck is mounted on each end of the spindle head, which enables pieces up to 12 in. in diameter to be gripped.

The spindle is driven from the four-step cone pulley B, the power being transmitted through a large bronze spiral gear and hardened steel pinions. The power for the saddle motions is derived from the main pulley shaft through a geared speed box having a 5 to 1 range, all the changes being possible without removing any of the gears. These motions have independent clutches controlled by the hand levers C, E and F, and dogs on the saddles engaging the stops H, I, J and K effect the release.

The Four-State Section of the American Water Works Association is to hold an organization meeting on Tuesday, Jan. 18, at the Bellevue-Stratford Hotel, Philadelphia. C. R. Wood, R. D. Wood & Co., 400 Chestnut Street, Philadelphia, is a member of the committee in charge.

OPERATING POWER COSTS*

A Method of Standardization to Show How Closely the Minimum Is Approached

BY WALTER N. POLAKOV†

The cost of manufacture of power or any other commodity, being a result of numerous factors involved in production, is in final count the chief criterion upon which the market price, range of use, legislation, future developments, social welfare, etc., are dependent. Few if any of these questions can be intelligently answered from the knowledge of actual costs, owing to the effect of an unknown factor—degree of perfection of the actual performance.

Standardization and predetermination of cost of power production have never before been considered as possible undertakings, and their advantages were thought questionable. Predetermination of operating costs has not been made use of for other than estimates of probable future expenses prepared by promoters or contractors. These estimates are usually based, as is always the case in work of such nature, either on past performances modified by expectations, or on data obtained from actual performance of another plant considered as similar.

Realizing, on the other hand, that such estimates are inevitably colored by the personal sympathies and prejudices of the estimator, a demand for a class of disinterested counsellors has been created. As the financial and not the thermodynamic side of the question is more vital in the eyes of the investors, the predetermination of results of power production is often entrusted to public accountants who may or may not be fully equipped to account thoroughly for the influence of such factors as chemical and physical properties of available fuels on efficiency of boilers and furnaces, effect of load and machine factors, water rate of turbines under predominating condition of load, role of power factor, wattless current, phenomena of electric transformation, transmission, drop of voltage in distributing lines and numberless other factors affecting the cost of current either directly or indirectly.

CLASSIFICATION OF EXPENSES

All expenses incurred in the course of power production fall under analysis into two main classes and are either constant (within a certain range) for any output or variable in some direct proportion with the output.

Expenses that are independent of volume of output are at the same time independent of each other and do not characterize the efficiency of processes performed in the power plant. Their effect on unit cost is represented by a parabolic curve decreasing with the increase of output. They are exemplified by interest on investment, depreciation, sinking fund, insurances, management, pay roll (in some cases), taxes, etc.

Expenses that vary with the output of the plant characterize, other conditions being constant, the efficiency of operation, and their elements stand together in dependent sequence. If represented graphically, they show very irregular shaped curves peculiar to each set of equipment. Unit cost has a general tendency to drop with increased output, as the efficiency of boilers, turbines, etc., tends to improve with increased load; yet as with higher degrees of overload the efficiency decreases, the unit cost rises. With further increase of load when an additional unit is started, the efficiency again begins to improve until their cumulative efficient capacity is exceeded, when the unit cost commences to increase again. Such waves are sometimes very pronounced and generally, throughout the range of the plant's capacity, the number of waves on the unit cost curve is equal to the number of generating units installed. Fuel, water, certain supplies, and in less pronounced dependence, maintenance expenses, belong to this group of expenses, and for the purpose of classification of expense account, it is best to itemize them

correspondingly to the steps in which the energy is transformed during the generating process.

The criterion of economy is formulated by the interplay of three factors, time, product and cost. When only one factor varies, its effect on economy can easily be foreseen. Thus greater product, without change of time required or cost, increases the economy. Increase of either time of production or cost of production reduces the economy. Generally, however, all the factors vary simultaneously.

Such a general study can be made with respect to economy if more than one influential element is involved as simultaneous equations for each. The graphic method offers, however, an easier means of solving the problem.

DETERMINATION OF STANDARD COSTS

It is relatively unimportant whether the maximum limit of economy is determined empirically by rigorous observations, tests and analyses of all influential elements, or calculated from the principal data already available. *It is imperative that such study be made and the economy limit established, as this is the only criterion for judging the actual performance.* Carrying out the analysis of economy limit to its logical conclusion, the standard cost of product is arrived at, and evidently during this investigation, not only are itemized costs of individual partial processes found out, but the conditions and methods whereby standard cost can be attained are established. In other words, *unless the standard costs are established there is no measure of existing losses or exact knowledge how to eliminate them.*

Manifestly, in the course of determination of standard operating cost, such factors as inherent efficiency of equipment, its efficiency under different loads, prices of fuel and supplies, necessary and sufficient number of attendants and their compensation, etc., are already taken into consideration for a given plant. Any deviation observed between the actual operating cost and this standard cost indicates that some of the necessary conditions were not lived up to and, if standardization has been carried out in sufficient detail, it leads directly to the allocation of the loss to operating methods. On the other hand, any change in the basic data used in determination of the standard cost being known, adjustment of the standard cost can easily be made before the blame is put at the door of the operators. The efficiency of the thermodynamic process, domineering the operating cost in a power plant, should be made a subject of a most thorough investigation to ascertain first the maximum efficiency limit of each partial process, and then the result of their interplay. When this is accomplished, the entire process will be restudied for the purpose of standardizing methods and adjusting for such a balance of efficiencies of partial processes as will secure the maximum profit or economy from the expenditure of time, energy and money involved. In this, it is sometimes found that the most economical thermal efficiency is somewhat below the maximum obtainable, as the slight additional gain in efficiency necessary to reach the maximum is not warranted by the expenditure required for its attainment. When these limiting conditions are studied and determined, a method can then be defined for each member of the working force, prescribing his duties and the conditions he must maintain to secure the *most profitable* degree of efficiency.

Upon the conclusion of these studies, the best efficiency of each unit and their combination being known for any load, the standard cost for any output in a given time unit can be conveniently represented in graphical form.

The principles of determining the standard cost of maintenance and upkeep of the plant and equipment are substantially the same; the method of study, however, is somewhat different. It involves a study of design and construction of all elements of equipment; minute records of their service and cost of maintenance may lead to a modification of design, use of cheaper renewable parts, etc. Next, the standardization of supplies, beginning in the laboratory and followed by actual service tests, helps to determine not alone the purchase price, but the lowest service cost. Finally,

*From a paper presented at a meeting of the American Society of Mechanical Engineers, New York City, Jan. 11.

†Consulting engineer, Stamford, Conn.

time studies embracing schedules for inspection, routes for maintenance, men, standardization of tools, motions, methods, etc., conclude the investigation. The criterion is, of course, not the wages of the employee, but freedom from accidents, breakdowns and the lowest attainable cost of upkeep per unit of the plant's output. It is evident that there may not be any theoretically certain standard cost of maintenance, but an empirical standard thus developed is generally but a fraction of the best actual records of the past.

STANDARD COST CURVES AND THEIR USE

Upon conclusion of this double analysis of the maximum economy obtainable, the graphs of standard cost of power production may be drawn. Curves may be conveniently arranged in the co-ordinates of cost and output. It will then be noted that the time element is one of the most influential factors in power economy. Whereas in some cases, where the number of generating units is large, the coal-rate per unit of output remains fairly flat and the other items of cost reduce rapidly with increased production per unit of time, in other cases the standard cost of fuel also decreases as the time during which a certain output is produced is reduced. It is evident that any number of curves may be plotted following the above method, each curve representing an itemized standard cost according to the adopted classification.

Practical use of such predetermined standard costs can be made extremely simple by the use of these graphs. For busy executives or owners, the entire cost record visualized by graphical representations of the items of account is found very convenient. The actual unit cost and the standard unit cost are plotted to the same scale, the deviation of one from the other suggesting at a glance the degree of perfection of the performance. The total expense curve and the cumulative expense curve may be shown on the same graph to a suitable scale; the latter curve is found very serviceable for comparing these items with the appropriation made. The accuracy of such graphic records is sufficient for most practical uses and references, as it allows the interpolation of unit costs to 0.001c. If the exact total of expenditure is wanted it can be had at any time from the book records, whereas the use of books and figures exclusively lacks the comprehensiveness and visual instructive value of graphs.

Any comparison of production costs of various plants may now be made in a different light. By comparing standard costs of one plant with those of another, one gains the knowledge of how much cheaper the power can be produced in one plant than in another, due to its various physical advantages, corrections for load and output all being automatic. Again, by comparing how near the actual cost of one plant is to its standard cost with the difference between actual and standard costs of another plant, one has at once a measure of quality of methods and management. Thus the actual cost per kilowatt-hour of 35c. in one plant means a worse operating efficiency than 48c. in another plant under another load condition. Yet without such accurately predetermined standard costs that are individual for each plant and condition of load, no correct comparison is possible, and conclusions from a mere study of accountants' figures are apt to be grossly in error.

The cost system developed along the lines discussed will not only afford a means for clear understanding of operating and managerial problems, but offer a basis for cost comparison of different plants. Inasmuch as standard cost cannot be determined without first finding out how the maximum economy can be secured, the process of standardization of costs is also a process of devising the best way for operation and management. Once both methods and results are positively established, costs are but the form of expression of the final result. It is true that the standard cost is influenced by the price of commodities used in the course of generation of power, as well as by some conditions beyond the control of the management and operating engineers, but the adjustment of the standard costs to every change of these factors can be made as simple as the use of a slide rule. Without predetermined standards, superintendents and managers will continue to believe that they control the production and owners will re-

main in a happy ignorance as to how much of their money goes to waste and why. Only after the establishment of standards and ideal costs of production by means of the most rigorous analysis, will cost accounting be of help to engineers, and only then can it be said that the generation of power is directed by management and controlled by engineers.

Connellsville Coke in 1915

The Connellsville, Pa., *Courier* of Jan. 6, gives a resumé of conditions in the coke trade of 1915. It says that the Connellsville and Lower Connellsville coke regions shipped in the year an aggregate of 17,921,216 net tons of coke valued at \$32,258,188, the average price being estimated at \$1.80 per ton. Compared with the year 1914 this was a gain of 27 per cent in volume and 14 per cent in value, but compared with the year 1913, the banner year of the Connellsville coke trade, it was a falling off of 16 per cent in volume and 46 per cent in value. The coke trade of 1915 was more encouraging in growth than in price. The year opened with an output of but 200,000 tons weekly, but the average for the first quarter was 250,000 tons, for the second quarter 312,000 tons, for the third quarter 381,000 tons and for the fourth quarter 434,000 tons.

The following tabulated statement gives a comprehensive view of the coke trade of the past 36 years, during the whole period of its importance as an industry. It shows the number of ovens in commission at the close of each year, the annual output, the average price and the gross value of the output:

Year	Total Ovens	Tons Shipped	Av. Price	Gross Revenue
1880	7,211	2,205,946	\$1.79	\$3,948,643
1881	8,208	2,639,002	1.63	4,301,573
1882	9,283	3,043,394	1.47	4,473,859
1883	10,176	3,552,402	1.14	4,049,738
1884	10,543	3,192,105	1.13	3,607,078
1885	10,471	3,096,012	1.22	3,777,134
1886	10,952	4,180,521	1.36	5,701,086
1887	11,923	4,146,989	1.79	7,437,669
1888	13,975	4,955,553	1.19	5,884,081
1889	14,458	5,930,428	1.34	7,974,663
1890	16,020	6,464,156	1.94	12,537,370
1891	17,204	4,760,665	1.87	8,903,454
1892	17,256	6,329,452	1.88	11,598,407
1893	17,513	4,805,623	1.49	7,141,031
1894	17,834	5,454,451	1.00	5,454,451
1895	17,947	8,244,139	1.23	10,140,658
1896	18,351	5,411,602	1.90	10,282,043
1897	18,628	6,915,052	1.65	11,409,835
1898	18,643	8,460,112	1.55	13,113,179
1899	19,639	10,129,764	2.00	20,259,528
1900	20,954	10,166,234	2.70	27,448,832
1901	21,575	12,609,949	1.95	24,589,400
1902	26,329	14,135,740	2.37	33,508,714
1903	28,092	13,345,230	3.00	40,035,906
1904	29,119	12,427,468	1.75	21,748,069
1905	30,842	17,896,526	2.26	40,446,149
1906	34,059	19,999,326	2.75	54,998,146
1907	35,697	19,029,058	2.90	55,184,268
1908	37,842	10,700,022	1.80	19,260,040
1909	39,158	17,785,832	2.00	35,571,664
1910	39,137	18,689,722	2.10	39,248,416
1911	38,904	16,334,174	1.72	28,094,750
1912	38,884	20,000,873	1.92	38,401,676
1913	39,067	20,097,901	2.95	59,288,808
1914	37,965	14,075,628	2.00	28,151,276
1915	38,986	17,921,216	1.80	32,258,188

The furnace interests began the year with 9981 and the merchant operators with 7361 ovens in blast, or 45 per cent and 46.6 per cent of the respective totals. At the close of 1915 the total production was about 85 per cent of capacity.

Increasing Gary Ore-Handling Plant

The ore-handling capacity at Gary, Ind., will be increased about 50 per cent during the coming summer by the erection of two 17-ton Hulett unloaders, a contract for which has been placed by the Indiana Steel Company with the Wellman-Seaver-Morgan Company, Cleveland. One machine is scheduled to be ready for operation July 15 and the other Aug. 15. The ore-handling equipment at Gary now consists of five 10-ton unloaders.

The Chattanooga Roofing & Foundry Company, Chattanooga, Tenn., entertained thirty-five employees at a dinner at the Hotel Patton Jan. 3, this being an annual event. J. E. Annis, president of the company, acted as host, and J. E. Edgerton, president of the Tennessee Manufacturers' Association, was one of the speakers.

SEEK TO RESTRAIN EMPLOYEES

Court Asked to Frustrate Activities of War Employment Agents

George A. Ohl & Co., Newark, N. J., founders, machinists and manufacturers of machines for sheet metal workers, have resorted to the Chancery Court of New Jersey to prevent some of their employees from leaving their employ to obtain higher wages in plants making munitions. The case is an outcome of activity on the part of agents representing munitions manufacturers who are offering increased wages as an inducement for machinists already employed to go to the munitions shops. In most of the smaller manufacturing towns the local newspapers are printing advertisements stating that hands of one kind or another are wanted at good wages. In some cases no firm is mentioned, merely that Mr. —— can be interviewed at a local hotel.

George A. Ohl & Co. had a strike at their plant a short time ago, and the terms of settlement specified that the agreement reached should hold for one year. The company considered therefore that it could safely proceed with contracts to supply the machinery of its manufacture, and depend on its employees to perform their part. Later, the agents of the munitions makers appeared and some of the company's men sought other employment.

Ohl & Co. thereupon applied to the Chancery Court to prevent a machinist from leaving their service, and Vice-Chancellor Howell issued an injunction restraining the workman from entering the employ of another firm. On Dec. 21, however, Vice-Chancellor Stevens discontinued the injunction, holding that the trial might not ensue for some time, and that it would not be just to deprive the workman from a livelihood in the meantime. A suit in chancery was brought for the reason that most of the workmen have no property, and nothing can be recovered from the loss sustained by their leaving Ohl & Co. With regard to loss, the company states that the breaking-in of new men to work with which they are unaccustomed would be costly to the firm.

As matters now stand, while the court can prevent the workmen, who are subject to the agreement reached with the ending of the strike, from giving their services to other firms, it cannot compel them to adhere to their contract and work for Ohl & Co. The company intends to push the suit to a finish, asserting that manufacturers should be protected under such circumstances, as under existing conditions the execution of their contracts is most uncertain. A member of the company expresses the opinion that the high wages paid by munitions makers will be a cause of regret when the war and present abnormal conditions come to an end.

Whitaker-Glessner Company to Build Open-Hearth Plant

The Whitaker-Glessner Company, Wheeling, W. Va., has decided to build open-hearth furnaces and blooming and sheet bar mill on property it has recently acquired at Beech Bottom, Brooke county, about 13 miles from Wheeling, W. Va. The plans of the company are as yet tentative, but it expects to be able in a short time to make definite announcement of number and capacity of furnaces. The output of sheet bars will be used in its sheet mills in the Wheeling district, but a part may be sold in the open market.

Orders recently received for rolling stock by the Canadian Car & Foundry Company, Ltd., include one for nearly 2000 freight cars for the French Government. The Kingston Locomotive Company has just received contracts for fifty additional locomotives from Canadian roads to be turned out by next summer. Canada is looking forward to large orders for cars, locomotives and other railroad equipment from France, Russia, India, Australia, China and South Africa at the termination of hostilities in Europe.

Crucible Steel Company Additions

In THE IRON AGE of Jan. 6 brief mention was made of the improvements and additions under way by the Crucible Steel Company of America, Pittsburgh, at its various plants. We have now received from the company more details, as follows:

Crescent Works: At this plant the company just completed a new machine shop of steel and brick construction, which is being fitted up with modern tools. Upon the site of the old machine shops, it is erecting a new mill office and laboratory and moving six Rust boilers to its new central boiler plant, where it is putting in the latest type of stoker, so as to eliminate as far as possible the waste of fuel and the making of smoke.

Singer-Nimick Works: The company is now planning the centralization of its boiler plants in this works, so as to install stokers and eliminate as far as possible the production of smoke, which has given some trouble.

Atha Works: At this point the company is just completing an addition to the ordnance department, containing forging presses and all necessary machinery to continue its manufacture of munitions of war for the United States Government, which it has been doing for many years. In connection with this new construction, it has erected an entirely new electric power station, so that the whole plant will be operated largely by electric power.

In addition to the above, it is now erecting a large new office and laboratory building of brick and steel, in which all of the latest improvements will be installed. It is also building a new machine shop of steel and brick and a new crucible melting house to take the place of older buildings.

During 1915 a new yard crane runway was built, about 900 ft. long, to take care of ingots and billets.

Syracuse Crucible Steel Company: The buildings which it recently constructed at this plant have been turned over to the Halcomb Steel Company, as an addition to its plant, which is directly across the railroad. New mills have already been contracted for and are now being installed in the Syracuse Crucible Steel Works, so that by the middle of 1916, it is hoped that the new crucible furnaces to be installed there, and the mills now being erected, will be in active operation. Electricity will be used for all purposes, except heating. In order to further develop the work at the Syracuse plant, the company recently purchased additional ground nearby, upon which it is now erecting brick buildings to contain the latest type of annealing furnaces.

Halcomb Steel Company, Syracuse, N. Y.: Another Heroult electric furnace has been contracted for and, with the addition of a number of new annealing furnaces, that plant is now practically a complete unit.

Crucible Fuel Company: The company recently contracted for a number of large steel barges, each to carry 1000 tons of coal. With the addition of this new equipment, and the construction of a large number of new houses for its employees at this works, it will shortly be able to mine 50,000 to 60,000 tons of coal per month. Arrangements are now being made to erect a steel coal tipple, so as to ship coal more largely by rail.

Pittsburgh Crucible Steel Company: At this plant at Midland, Pa., the improvements during the year 1915 have been completed. Added to them it is now erecting an addition to its blooming mill building, about 500 ft. long, in which it is installing a new 28-in. billet mill. More soaking pits and gas producers are being added, with the necessary buildings to protect them, in order to increase the output at this plant.

The La Follette Coal & Iron Company: La Follette, Tenn., has taken over, subject to confirmation of sale by the court, properties at La Follette and will operate the coal and iron mines, coke ovens and blast furnaces heretofore operated by the La Follette Coal, Iron & Railway Company and the La Follette Iron Company. J. S. Bartlett, Boston, is vice-president.

STRIPPING MESABA DEPOSITS

A New Method Employing a Large Revolving Shovel to Uncover Iron Ore

For the first time, the method of stripping the overburden from coal deposits by the use of a large revolving shovel, a method which has proved a success in the Kansas district and elsewhere, has been applied on the Mesaba iron range. It is too early to attempt to compare costs of operation with any degree of accuracy, but the results thus far secured have, it is stated, been satisfactory to the contractors. Butler Brothers, who were the first to use heavy shovel equipment of the standard railroad type on the range, are employing the new method on their Mace No. 2 mine at Nashwauk, Minn.

The shovel is a No. 225-B Bucyrus, weighing about 320 tons in working condition. It is equipped with an 80-ft boom, has a dipper with capacity of

and does away with overheating the checkbelt on the hoisting drum when lowering the dipper.

Another improvement is the placing of the main hoisting engines and machinery, as well as the swinging engines, on a heavy steel plate girder frame, 4 ft. in depth. This girder frame is riveted up solid and is shipped intact to the field.

The boiler, engines and machinery of this shovel were designed especially for the purpose. The entire shovel is of steel construction excepting the sides of the house or upper body which revolves on the turntable base. All gearing is of cast steel with machine cut teeth.

The total stripping at Mace No. 2 will amount to between 550,000 and 600,000 cu. yd. The shovel is cutting swaths measuring about 110 ft. bottom width, in an overburden averaging 35 ft. in depth with a slope of about 1 to 1, making a top width of approximately 180 ft. It is loading 20-yd. Western air-dump cars placed upon the bank which are hauled in trains of three cars each to the dump about a third of a mile away. The material is



Stripping Overburden from Ore Deposits on the Mesaba Range with a Large Revolving Steam Shovel

6 yd., and a dipper handle 58 ft. in length, allowing it to cut a level floor 128 ft. in width and reach 61 ft. in height, measuring from the open dipper door. Owing to its extra height it has the same scope of action as other shovels with longer booms.

The upper body revolves on a turntable 30 ft. in diameter. The turntable base is 30 ft. square, of massive construction and entirely of steel. It is mounted on four steel swivel trucks, each having four double-flanged wheels, 30 in. in diameter for a 36-in. gage track.

The shovel is self-propelling by chain gearing to all four trucks. The truck base is fitted with a heavy steel equalizer beam across one end, having a center plate bearing in the middle and jack screws at both ends which rest upon the trucks and by a self-adjusting movement allow the truck to follow any unevenness of the ore surface when the shovel is moved up. The jack screws are then set tight and all four corners of the base are evenly supported.

One of the features of this shovel is the single-part hoisting rope which lifts the dipper and leads straight from the main drum to a sheave 8 ft. in diameter on the point of boom, over which it passes to the dipper, thus doing away with the customary three-part rope and dipper sheave. This plan is relied upon to lessen the wear on the rope

good digging. It is composed of a sandy loam capped with 2 or 3 ft. of roots and vegetable matter, as the property at one time was wooded ground.

The first thing that strikes one accustomed to the familiar stripping operations so long successfully practiced upon the range, is the absence of the usual large force of laborers on the job. The shovel is taking the entire depth of the stripping in one cut which is made possible by its great digging and dumping reach. This naturally eliminates a large track gang and makes it worth while to lay the dump train track with greater care as it is not necessary to shift as frequently. The shovel, furthermore, moves up but once in 6 or 7 hr. The entire shovel operation is managed by four men on the shovel, namely, an engineer, a cranesman, a fireman and an oiler and two pitmen.

One interesting problem had to do with evolving a simple method of bringing coal to the shovel. At first an incline was erected from the cars on the bank to the shovel. This method, however, has been discarded in favor of a simpler one. The coal is placed in big boxes holding about 2 tons each which are brought up to the job on the dump cars. Wire cables are attached to these boxes so that they may be thrown over the shovel's dipper lip and the box can be lifted from the dump car and placed in the cut with very little delay or trouble.

High and Low Sulphur in Basic Steel*

Results of Extensive Experiments in Varying the Sulphur in Open-Hearth Practice—No Difference in Finishing Products High in Sulphur

BY DR. J. S. UNGER

During the last fifteen years the proportional tonnages of steel manufactured by the Bessemer and open-hearth processes have undergone a great change. During 1900 about 65 per cent of the total tonnage of steel made was Bessemer and 34 per cent open-hearth. In 1914 about 26 per cent was Bessemer and 73 per cent open-hearth. Of the latter 94 per cent was made by the basic process.

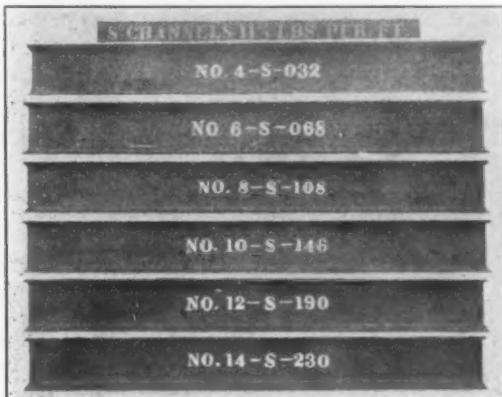


Fig. 1—Samples of 8-In. Channels Rolled from Steel of Varying Sulphur Content

As the low phosphorus ores became scarcer, higher phosphorus ores supplanted them. The latter produced a pig iron too high in phosphorus to be used in the acid Bessemer process; consequently the basic open-hearth process, with its attendant purification, grew rapidly.

HIGH SULPHUR IN STEEL

Wherever Bessemer steel has been used, the sulphur content has varied from 0.050 to 0.080 per cent, or even higher, depending on whether the iron was used direct from the blast furnace or remelted in a cupola. Millions of tons of Bessemer steel, containing an average of 0.070 sulphur, have been used for almost every purpose. The greater part of such steel is still in service, giving an excellent account of itself, and furnishing us with the best possible evidence that steel may contain a reasonable amount of sulphur without being injured in quality.

With the advent of basic open-hearth steel the consumer found that from 0.040 to 0.050 per cent sulphur, or about two-thirds that of the Bessemer, was the usual sulphur content of such steel. Believing that high sulphur always indicated that the steel was bad, he naturally insisted on the lower limit, or below 0.040 per cent sulphur in his steel.

Sulphur in steel, whether justly or unjustly, is in many cases held responsible for the bad working of steel. As a result the specifications covering the allowable amount of this element have been gradually lowered until in certain cases below 0.030 per cent is the limit demanded. It is very difficult to reach this limit by the basic open-hearth process,

and when reached there is a grave doubt in the minds of many whether the quality of the steel has not suffered by the excessive purification required to produce such results.

It became almost the universal practice when steel showed a tendency to work badly or become red short to make an analysis of the steel. If this analysis indicated that the steel had the proper or permissible amounts of the usual elements, but happened to be a few thousandths of a per cent higher than the permissible amount of sulphur, the sulphur was held responsible for the trouble. Such decisions are made without considering other causes occurring in the manufacture of the steel; such as the heating and rolling and subsequent operations in working it up into a finished product.

The manufacture of steel in quantities of several tons at one time began when the Bessemer process was introduced about 50 years ago. Chemical analyses at that time were crude, or not made at all. Failures due to poor raw material or improper metallurgical treatment were common. Sulphur was largely blamed for such results, and a strong prejudice against it was established. This belief was handed down from one person to another. Rarely has it been questioned, nor have many efforts been made to establish the truth, until at the present time few are ready to believe that sulphur up to a reasonable amount, say under 0.100 per cent, does not affect or at the most only slightly influences the working properties during manufacture, or the quality of the finished steel.

EFFECT OF LOW SULPHUR ON STEEL

Some steel making processes have been brought forward which produce a steel lower in sulphur than the basic open-hearth process, but where the author has had an opportunity to compare such steel with open-hearth steel having the same physical properties, no difference could be detected in the surface produced or the hot working properties.

The subject of sulphur in steel has been studied by others. Results have been published in which

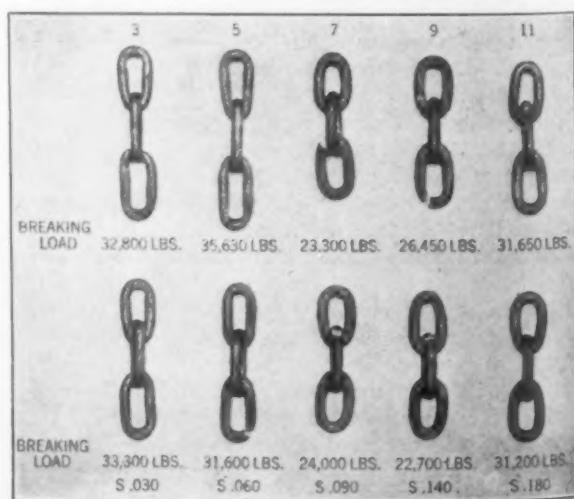


Fig. 2—Machine-Made Chain Tested to Destruction, High and Low Sulphur

*From a paper read at the annual meeting of the Society of Automobile Engineers, New York, Jan. 6, 1916. The author is manager of the central research bureau, Carnegie Steel Company, Duquesne, Pa.

soft steel and wrought iron containing 0.300 to 0.600 per cent sulphur have been successfully forged. The details are lacking, but it is my belief that such material would stand very little heating to a high temperature for forging without cracking or crumbling during the forging operation. I have in mind an investigator who has recently studied the effect of sulphur in different heat treatments of steel, with sulphur ranging from 0.032 to 0.157 per cent. Another studied its effect in rivet steel, containing from 0.042 to 0.105 per cent sulphur; a third in drop forgings containing from 0.028 to 0.190 per cent sulphur. Their results agree in this point: When other conditions are equal, no marked differences were observed in the working properties or in the quality of the finished material. Where slight differences were noticed in the working properties, they were corrected by lowering the hot working temperatures of the very high sulphur steels.

OBJECT AND METHOD OF THE INVESTIGATION

The purpose of this investigation was to prepare steels of different degrees of hardness, each containing varying amounts of sulphur, then work these steels into finished products and examine them carefully during the manufacture and after completion for difference in quality.

Three heats of steel of 68 tons each were made. These were low sulphur basic open-hearth steels of soft, medium and moderately hard varieties of approximately 50,000, 70,000 and 90,000 lb. per square inch tensile strength, the carbon contents being 0.09, 0.32 and 0.51 per cent, respectively.

No selection of stock or furnace was made, the furnaces being taken at random. The heats were cast into twenty-four 18 x 20-in. ingots of 6300 pounds each. Twelve ingots from each heat were used in the investigation, or a total of 100 tons. After a discard had been made to eliminate any highly segregated or streaked condition in the steel and the regular waste provided for, about fifty tons of steel were used in the tests carried out.

The sulphur content of the ingots was increased progressively by adding amounts of sulphur to different ingots from the same heat, raising the amounts in the higher sulphur ingots of the series greatly beyond that ordinarily found in commercial steels, until a point was reached at which it was difficult, if not impossible, to roll the ingots by the usual heating and rolling operations commonly practiced at the mills.

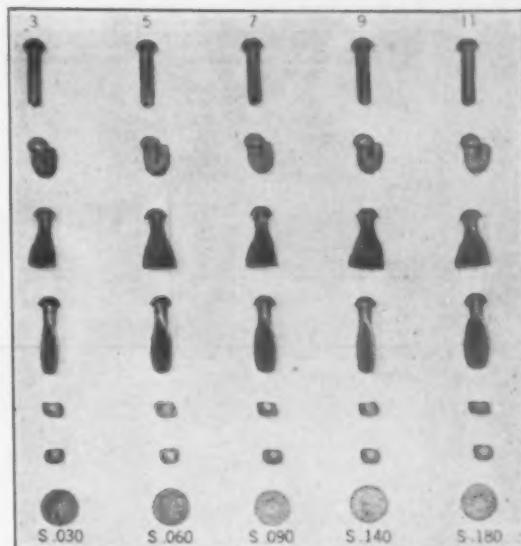


Fig. 4—Rivets Subjected to Hot and Cold Tests. The top row is the completed rivet; the second row, the same cold bent; the third row, hot-flattened and cold bent; the fourth row, hot-flattened; the fifth row, cold upset; the sixth row, hot upset, and the last row, hot-flattened, all with varying sulphur content

The sulphur additions were made in the pure powdered form to the ingots during pouring. Pyrites was considered but discarded as a possible means of introducing varieties. The additions were regulated to secure as nearly as possible a uniform increase of 0.030 per cent sulphur from one ingot to the next higher. The aim was to obtain steels that, excepting sulphur, would be alike in manufacture and composition, thus keeping out any variables and furnishing an opportunity to study the effect of sulphur alone.

The ingots were rolled into such sizes as would be needed to fabricate the different steels, either by hot or cold working, into such finished articles as they were best adapted to by composition. Sheets, wire products, rivets, chains, tubes, channels, plates, rails, axles and drop forgings were made. In this paper I will refer only to such steels as are of particular interest to the automobile industry.

Owing to the great variety of materials made, it was not always possible to use steel of the exact composition ordinarily employed for a certain purpose, as the steel was sometimes a little harder or softer than required. This feature does not, however, influence the comparative results.

The manganese of the three heats was 0.43, 0.62 and 0.67 per cent respectively. Attention is called to this point, as large quantities of steel containing from 0.070 to 0.120 per cent sulphur and 0.75 to 1.00 per cent manganese are made regularly for consumers who must have a steel especially fitted for rapid drilling, turning or threading purposes. The comparatively high manganese in this screw or nut stock has an appreciable effect on the hot working properties. This was not the case in the low manganese steels studied in this investigation.

The ingots were heated to 1250 deg. C. and then rolled in the regular way, no attempt being made to give the higher sulphurs any preference. All ingots were rolled, except the two highest sulphur ingots of the 0.09 per cent carbon heat, containing 0.250 and 0.254 per cent sulphur. These ingots cracked badly in rolling and were removed from the roll tables and scrapped. In rerolling from the blooms, billets or slabs into finished materials, no trouble was experienced nor any difficulties met. Table 1 shows the chemical composition of each heat and the sulphur content of each ingot.

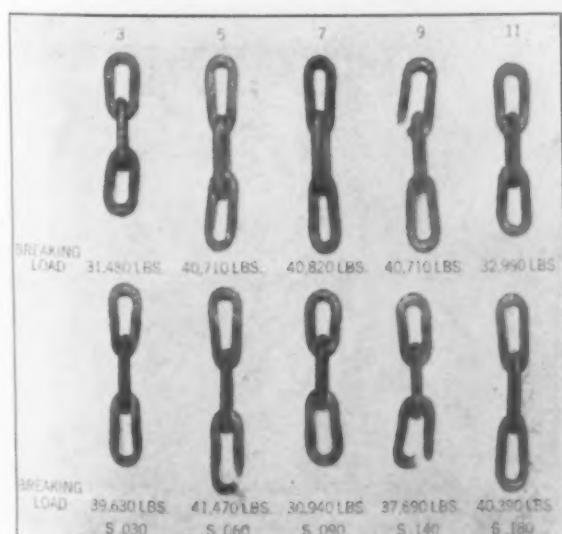


Fig. 3—Hand-Made Chain Tested to Destruction, High and Low Sulphur

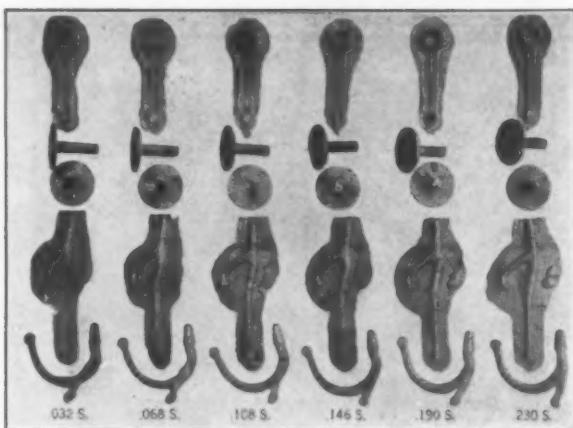


Fig. 5—Automobile Drop Forged Parts Made of High and Low Sulphur Steel

The rolling properties of these steels are shown in several of the illustrations in this paper, which give a general idea of the rolled finished material.

HOT WORKING PROPERTIES

Channels enter into the construction of automobile truck frames. Fig. 1 shows six pieces 6 ft. long each of 8-in. channels, of 0.32 per cent carbon

Table 1—Chemical Analyses and Purposes for Which Steel Was Used

Basic Open-Hearth Heat No. 81160

Chemical analysis: Carbon, 0.09; manganese, 0.43; phosphorus, 0.012; sulphur, 0.031 per cent.

Sulphur content in ingots: 0.030, 0.031, 0.050, 0.060, 0.090, 0.116, 0.140, 0.160, 0.180, 0.250, 0.254 per cent.

Purposes for which used: Rivets, chains, sheets, wire, tubes and pipe.

Basic Open-Hearth Heat No. 71163

Chemical analysis: Carbon, 0.32, manganese, 0.62; phosphorus, 0.014; sulphur, 0.032.

Sulphur content in ingots: 0.032, 0.068, 0.108, 0.146, 0.190, 0.230.

Purposes for which used: Drop forgings, channels, plates and tubes.

Basic Open-Hearth Heat No. 76185

Chemical analysis: Carbon, 0.51; manganese, 0.67; phosphorus, 0.015; sulphur, 0.025.

Sulphur content in ingots: 0.025, 0.055, 0.095, 0.135, 0.167, 0.230.

Purposes for which used: Axles, drop forgings, rails and wire rope.

steel, with the corresponding sulphur of each piece stenciled on channel. No tearing or red shortness is noticeable on the thin flanges of the higher sulphurs.

The ability to weld the soft steel of 0.09 per cent carbon was demonstrated satisfactorily. Three pieces of each sulphur content were made. The short pieces of three links each were tested to destruction with results shown in Fig. 2. Additional chain, hand made, shown in Fig. 3, was tested. The stock for these chains was rolled 1/64 in. light in gage, in order that this size could be used in making the rivets. This is not the usual practice, as machine-made chain stock is rolled 1/32 in. over gage to provide for scaling and to fill out the welding dies of hammer. This smaller diameter has given lower results than is ordinarily obtained on standard chain, but the results are truly comparative.

The greater average strength of the hand-made chain over the machine-made is not due to better workmanship, but to the fact that the lap in the hand-made chain is almost twice as long.

No trouble was experienced in either the hand or machine-made chain until No. 9 or 0.140 per cent sulphur was reached, No. 11 of 0.180 per cent sulphur acting similarly. It was found that both could be welded perfectly at the regular temperature and did give good results, but that lowering the welding temperature about 100 deg. C. pre-

vented any cracking or crumbling of the steel in welding.

The evidence seems to show that good and bad welds are more a question heating and workmanship than either high or low sulphur, as either kind of weld is found in any of the chains tested.

A number of rivets, 3/4 in. diameter by 2 in. long under the head, of the 0.09 per cent carbon steel were made and subjected to the various hot and cold tests shown in Fig. 4. To determine if these rivets were of the same strength under shearing stress, ten bars, having two 13/16-in. holes drilled 2 in. from one end, were riveted together by machine at an estimated temperature of 1200 deg. C. These bars were then tested with the results shown in Table 2. Practically no difference is observed in the tests.

A number of bars from both the 0.32 per cent and 0.51 per cent carbon heats of various sulphur contents, 2 in. x 2 in. x 16 ft. long, were rolled and sent to two prominent automobile manufacturers with a request to drop forge them in accordance with the regular practice, into such shapes as would indicate if any difficulties would be encountered in the heating or forging.

The author was present when this work was done. Crankshafts, connecting-rods, steering knuckles and other parts were forged. Some of these are shown in Figs. 5 and 6. The flash or excess metal forced out between the dies was not always sheared off, it being allowed to adhere to the forging to show any tearing at the thin outside edges. The appearance of the flash seems to furnish the strongest evidence of the ability of the high sulphur steels to stand severe hot work.

The size, 2 in. x 2 in. bars, furnished the manufacturers was of too large a section to do the best work for a number of the smaller forgings. As a

Table 2—Shearing Strength of Riveted Joints

Carbon, Per Cent	Sulphur, Per Cent	Shearing Strength in Lb.
0.09	0.030	48,900
0.09	0.060	48,300
0.09	0.090	48,800
0.09	0.140	46,700
0.09	0.180	47,400

consequence, more actual work, or greater reduction, than in the regular practice was necessary to produce the forgings under the drop hammer. In the case of the crankshafts the regular stock used is 3 1/2 in. diameter, but in this case it was 2 in. square, which did not give enough metal to fill the forging dies properly, leaving parts of the forging

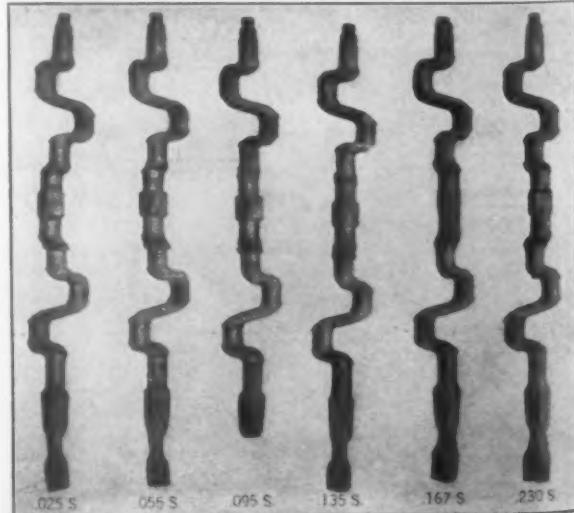


Fig. 6—Drop Forged Crankshafts Made of High and Low Sulphur Steel

ings in an unfinished condition. This is of no importance in these tests, as the object was to determine if the higher sulphur steels would stand the severe bending necessary to forge these crankshafts.

When finished, these forgings were cleaned by dilute acid or the sand blast and then carefully inspected by the manufacturers and the author to detect any surface or other defects, but no differences could be observed in the high and low sulphur steels of either carbon.

COLD WORKING PROPERTIES

A number of No. 26 gage sheets were rolled, then galvanized and afterward made up into spouting. In seaming and beading the spouting, no cracks developed on any specimen, while the coating adhered as closely to one sheet as to another. This work bears a close relation to the stamping or drawing of automobile mudguards, hood covers, bodies or other parts.

HEAT TREATMENT

Tensile specimens were machined from the drop forged steering knuckles of 0.32 per cent carbon after they had been subjected to the heat treatment given in Table 3. Similar tests after treatment were made from the 1 1/4 in. diameter rounds used in drop forging the clutch pilots from the 0.32 and 0.51 per cent carbon steels. The results obtained are given in Table 4.

CASE-HARDENING

Short pieces of 3/4 in. diameter rounds from the 0.09 per cent carbon steel were packed in ordinary case-hardening compound in the same container, then heated to 900 deg. C. for 12 hr., afterwards reheated to 860 deg. C. and quenched in cold water. The surface of the bars was roughly polished and the Scleroscope hardness determined at several points on the surface. The depth of case and hardness were the same for each

bar regardless of the sulphur content, ranging from 85 to 87.

EFFECT OF SULPHUR ON MACHINING QUALITY

Where any machining was done on the finished material, or in preparing test specimens before and after treatment, no material differences were found. The only noticeable thing was that the higher sulphur steels of any carbon gave a smoother machined surface than the lower sulphur under the same condition of feed, speed or depth of cut. In cutting threads on some 1 1/4 in. pipe a test was made by attaching an arm 22 1/2 in. long to the die,

Table 5—Threading Tests of 1 1/4-In. Pipe

Carbon, Per Cent	Sulphur, Per Cent	Cutting Power in Pounds
0.09	0.031	73.5
0.09	0.050	70.6
0.09	0.090	68.5
0.09	0.116	62.3
0.09	0.160	61.2

the opposite end of arm being attached to a dynamometer which registered the load in pounds. Table 5 gives the results on the .09 per cent carbon steel.

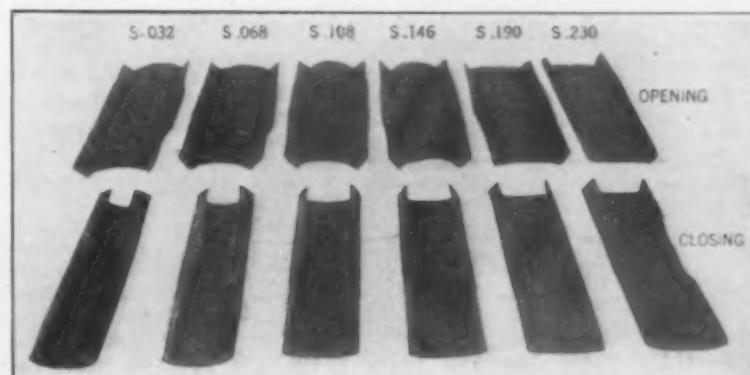


Fig. 7—Eight-Inch Channels After Opening and Closing Tests, Rolled from High and Low Sulphur Steel

This shows the average power required while cutting 11 1/2 threads per inch in ten samples of each sulphur content.

TENSILE TESTS OF THE UNTREATED STEELS

Tensile tests of 3/4-in. diameter rounds of 0.09 per cent carbon, of 8-in. channels of 0.32 per cent carbon and of axles of 0.51 per cent carbon, all in

Table 6—Tensile Tests of Untreated 3/4-In. Diameter Rounds

Carbon, Per Cent	Sulphur, Per Cent	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 8 in. of Area, Per Cent	Reduction of Area, Per Cent
0.09	0.030	31,360	50,460	30.8	64.2
0.09	0.060	32,740	50,900	30.2	65.3
0.09	0.090	30,890	51,400	31.2	62.5
0.09	0.140	31,600	50,700	32.5	64.2
0.09	0.180	31,530	50,960	30.7	62.3

Table 3—Tensile Tests of Heat-Treated Steering Knuckles*						
Carbon, Per Cent	Sulphur, Per Cent	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 2 in. of Area, Per Cent	Reduction of Area, Per Cent	
0.32	0.032	62,250	83,250	30.0	60.0	
0.32	0.068	49,375	78,375	31.5	62.8	
0.32	0.108	52,750	77,750	30.0	58.0	
0.32	0.146	58,875	77,875	27.0	61.3	
0.32	0.190	51,875	76,875	28.0	53.8	
0.32	0.230	57,250	76,250	29.0	53.8	

*Annealed at 900 deg. C., reheated to 829 deg. C., quenched in water and drawn at 538 deg. C.

Table 4—Tensile Tests of Heat Treated 1 1/4-In. Rounds Forged from 2 In. by 2 In. Billets

Carbon, Per Cent	Sulphur, Per Cent	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 2 in. of Area, Per Cent	Reduction of Area, Per Cent
0.32*	0.032	48,650	80,250	30.5	70.1
0.32*	0.068	48,550	75,550	22.8	68.8
0.32*	0.108	46,400	75,300	30.2	68.7
0.32*	0.146	46,700	73,350	31.5	67.2
0.32*	0.190	45,450	71,550	33.2	66.3
0.32*	0.230	45,850	70,100	31.5	65.0
0.51†	0.025	70,400	111,900	20.3	56.8
0.51†	0.055	76,300	120,800	19.7	51.3
0.51†	0.095	73,950	119,400	19.5	51.5
0.51†	0.135	76,800	120,600	18.8	49.2
0.51†	0.167	73,200	111,750	17.5	45.4
0.51†	0.230	66,350	106,550	20.5	44.7

*Heated to 830 deg. C., held for 20 min., quenched in water, drawn at 600 deg. C. for 30 min.

†Heated to 816 deg. C., held for 20 min., quenched in water, drawn at 565 deg. C. for 30 min.

an untreated condition, are shown in Tables 6, 7 and 8. The results on the soft steel, Table 6, are the same. In the medium steel, Table 7, there is a slight falling off in the physical properties when the sulphur exceeds 0.100 per cent. The

Table 7—Tensile Tests of 8 In. Channels

Carbon, Per Cent	Sulphur, Per Cent	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 8 in. of Area, Per Cent	Reduction of Area, Per Cent
0.32	0.032	45,300	71,580	25.5	54.8
0.32	0.068	45,000	70,060	26.2	54.8
0.32	0.108	47,110	70,670	24.2	52.9
0.32	0.146	46,210	70,060	26.2	50.9
0.32	0.190	48,920	70,060	24.2	48.4
0.32	0.230	47,250	67,920	24.5	47.9

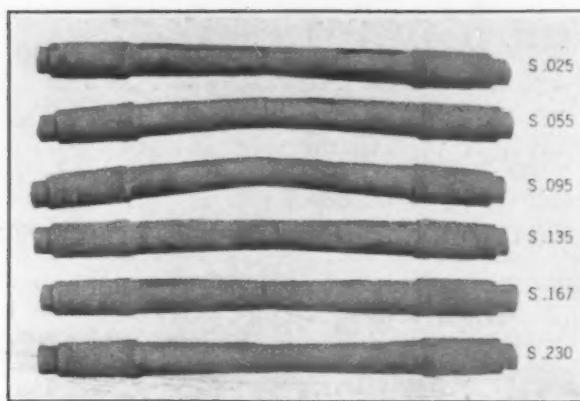


Fig. 8—Axles After Drop Test, Forged from High and Low Sulphur Steel

highest carbon, Table 8, giving the results on specimens taken at the edge and half way to center of axles, shows that as the sulphur rises there is a decrease in the ultimate strength, but an increase in the toughness, as shown by the reduction of area.

The bending quality of the 0.09 per cent carbon steel is shown in the tests of rivets, Fig. 4, the bending quality of the 0.32 per cent carbon steel in the opening and closing tests of the 8-in. channels,

Table 8—Tensile Tests of 0.51 Carbon Untreated Axles*

Sulphur, Per Cent	Specimen Cut from Edge of Axle			Specimen Cut Half-Way from Center of Axle				
	Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent	Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent
0.025	44,320	92,160	22.0	34.5	45,390	95,270	20.5	29.4
0.055	41,250	91,670	20.5	35.7	41,470	92,460	20.5	34.0
0.095	43,220	85,650	22.0	35.8	43,300	84,360	20.5	39.9
0.135	35,770	81,330	23.0	35.9	35,260	80,370	23.5	37.8
0.167	35,400	80,340	22.0	34.3	39,630	81,760	20.5	33.1
0.230	36,930	80,060	22.0	34.6	35,070	77,770	24.0	35.2

*Axles 4 1/4 in. diameter at center. Journal 4 1/4 in. x 8 in.

Fig. 7. Bending tests were not made on full size material made from the 0.51 per cent carbon steel.

In addition to the tests mentioned above, deflection tests were made on the full size channels

Table 9—Deflection Tests on 8-In. Channels*

Carbon, Per Cent	Sulphur, Per Cent	Load to Deflection in Pounds	Permanent Deflection in Inches
0.32	0.032	22,400	0.04
0.32	0.068	21,900	0.04
0.32	0.108	22,500	0.04
0.32	0.146	22,300	0.04
0.32	0.190	23,200	0.04
0.32	0.230	23,100	0.04

*Deflection tests made on full size 8 in. channels, 11.25 lb. per ft., 48 in. between centers. Load applied at center.

and drop tests on the axles. The results of the deflection tests on the channels are shown in Table 9 and the results of the drop tests on axles in Table 10. Fig. 8 shows the appearance of the broken axles.

SUMMARY

The tables and illustrations in this paper present the actual evidence obtained in investigating steels of different degrees of hardness with varying contents of sulphur. Wherever possible, variables which might affect the results have been avoided. In practically every case finished articles in common everyday use were made. The work

was carried out by the ordinary methods practiced, and in such sizes as are manufactured in the mills or shops. A great deal of work covering other lines of manufacture has been done and additional work is either under way or in contemplation. Any person who has access to the necessary facilities should have no difficulty in duplicating the work done.

The results presented speak for themselves and need very little comment. The author does not advocate paying no attention whatever to sulphur

Table 10—Drop Tests of 0.51 Carbon Untreated Axles*

Number of Blows	Axles Turned Over After Every Second Blow to	Deflection in Inches After Each Blow						
		1st Blow	2d Blow	3d Blow	4th Blow	5th Blow	6th Blow	7th Blow
0.025	33	4 1/2	5 1/2	3 1/2	5 1/2	3 1/2	5 1/2	3
0.055	29	4 1/2	5 1/2	3 1/2	5 1/2	3 1/2	5 1/2	3 1/2
0.095	30	4 1/2	5 1/2	3 1/2	5 1/2	3 1/2	5 1/2	3 1/2
0.135	30	4 1/2	6	3 1/2	6	3 1/2	5 1/2	3 1/2
0.167	21	4 1/2	5 1/2	3 1/2	5 1/2	3 1/2	5 1/2	3 1/2
0.230	14	4 1/2	5 1/2	4	5 1/2	4	5 1/2	5 1/2

*Axles rough turned. Size 4 1/4 in. diameter at center. Journal 4 1/4 in. x 8 in. Weight of tup, 2200 lb. Height of drop, 16 ft.

content of steel, but believes firmly that a steel containing less than 0.100 per cent is not necessarily bad, and that it will show little, if any, difference in quality when compared with the same steel of much lower sulphur, other conditions being the same.

Philadelphia Foundrymen's Association

The principal topic discussed at the regular monthly meeting of the Philadelphia Foundrymen's Association, Jan. 5, was the Pennsylvania workingmen's compensation law, and particularly its relation to the State workmen's insurance fund. Francis H. Bohlen, who framed the compensation act, explained in detail, its provisions, and some of its mooted points. The law provides that every employer must protect his workmen, farm labor and household employees excepted, either by self insurance or through the medium of recognized insurance companies.

Mr. Bohlen explained the operation of the State fund, which might be described as operating on the mutual plan, under State sanction, and financed by the State, an appropriation of \$300,000 having been made by the legislature. The conduct of the State workmen's insurance fund was, the speaker said, on sound insurance lines and absolutely non-political. The cost of insurance in the State fund is 10 per cent under the published rates of stock insurance companies, as approved by the State Insurance Commissioner, and it is expected that dividends up to 25 per cent of the premium will be returned to policyholders at the end of the policy year.

J. L. Clarkson, of the Central Branch of the Young Men's Christian Association, gave an account of the operation of the extension school system in various foundries and workshops in Philadelphia, under the supervision of the Pennsylvania State College, particularly in the engineering course. Over 4000 students are now enrolled in twenty-week courses, giving one hour a week to study. The cost for the twenty-week course is \$5, paid by the student or on some plan of co-operation between the employer and employee. He urged the extension of this system of study, as it had proved beneficial to employer and student alike.

The choice of officers to serve the association during the ensuing year resulted in the re-election of the entire present official body, as follows. The officers are: President, Thomas Devlin; vice-president, August A. Miller; treasurer, Josiah Thompson; secretary, Howard Evans; executive committee, Walter Wood, chairman, Thomas M. Egmon, H. L. Haldeman, Walter T. MacDonald and Walter S. Bickley; trustees, Thomas Devlin, Josiah Thompson and Howard Evans; official chemist, George C. Davis.

The 1915 War Trade in Machine Tools

A Distributer Discusses Features of the Past Year and Throws Light on the Question of Future Foreign and Domestic Demand

BY HENRY PRENTISS*

The breaking out of the European war found the machine tool industry in an unsatisfactory condition, growing out of the lean business years (in the main) following the panic of 1907, together with the constant demand on the part of the user for improved machines. A number of well-known concerns, whose products enjoyed the highest reputation, had become weakened under the severe financial strain and were facing the future with fear. The first shock of the war only intensified this condition, which continued until nearly the end of 1914, when evidences of renewed life became apparent. In the beginning of the year 1915 this activity was more pronounced, until in the early spring this industry became fully alive to the wonderful prosperity knocking at its doors. At first the demand came from abroad to the manufacturing plants whose products were well adapted for the manufacture of rifles, shrapnel, fuses, etc. This demand soon broadened to include machine tools suited to the manufacture of high-power ordnance, projectiles, submarines, aeroplanes, etc.

SWIFT TRANSITIONS OF THE YEAR

The needs of the foreign war grew in volume and insistence, for not only munitions but also food products, shoes, clothing and other equipment, as well as live stock, and this indirectly brought activity to many lines of business. With the growing pressure of foreign requirements this activity enlarged in ever-increasing circles until the call for machine tools embraced the entire range of product of this industry. Stocks on hand which in some lines were very large, were soon absorbed, and although the volume of production steadily grew and greatly exceeded all previous outputs, yet day by day the demand, more and more extended, far outstripped the supply and deliveries were deferred further and still further, so that to-day many manufacturers are refusing orders unless deliveries are accepted from six to twelve months in the future, prices to be determined at dates of shipments, and orders accompanied by an iron-clad non-cancellation agreement with a satisfactory cash deposit. Yet in spite of these seemingly prohibitive provisions the volume of orders still keeps up and is likely to continue for an indefinite period.

We hear it said, when advising a machine tool buyer to wait until a more opportune time to make his purchase: "I must order now, otherwise even the far-off delivery will be lost"—showing how strong is the belief that the future can only bring added prosperity and now thought is centered in the wisdom of greater facilities for increasing production.

The abnormal demand for machine tools for producing high-power guns, projectiles, shrapnel, rifles, etc., has induced a number of concerns, estimated at fifty or more, heretofore engaged in producing other lines, to embark in the new business of manufacturing machine tools.

During the year 1915 materials and wages costs have grown by leaps and bounds, with the natural outcome of higher selling prices; consequently, to-day machine tools cost from 20 to 70 per cent more than in the fall of 1914. The emphasis is placed on quantity and early delivery, price being of secondary importance. Such are the prevailing conditions in the machine tool industry in the closing days of 1915.

Would that the sun of optimism, which is shining unclouded in our heavens, might warm with its genial

rays mankind in Europe! Would that our present prosperity were founded on a better basis!

THE FUTURE

The second part of my subject, "What the Future Holds for the Machine Tool Manufacturers," is the burning question of to-day. We are well satisfied with the immediate past and the present; but what of the future? Should the present activity continue indefinitely, the problem of securing materials in quantities to meet requirements will be a difficult one. Even now it is most perplexing, as manufacturing facilities cannot be used to the best advantage for lack of essential materials, not to mention scarcity of efficient labor and additional machinery, so that a moderate recession in business activity would help to relieve this situation.

Is it not true that the crest of foreign buying has been reached, and that from now on purchases from this source will gradually diminish? Yet so long as the war lasts this buying will continue in large volume. When will the war end? No one can surely tell. Opinions entitled to credit vary greatly, but all agree the end will not be for some months to come, likely not until the close of the present year; possibly the war will go on for another year. The end, however, must come, sooner or later. What then? Likely temporary uncertainty; possibly depression and stagnation.

FAVORABLE AND UNFAVORABLE FACTORS

Among the obstacles to be removed for the continuance of good times after the termination of the war are the following:

Cancellation of unfilled orders dependent upon the duration of the war.

Cessation in a large degree of all activities caused by the war.

Disposition of the overstock of some kinds of machine tools, more especially engine and turret lathes.

Readjustment in manufactures at plants which have recently engaged in building engine and single purpose lathes.

Utilizing equipments of plants affected by ending the war.

Readjustment of present inflated prices.

Scaling down of labor and wages.

Inability to fulfil financial commitments because of changed conditions.

What are the assured helps to remove these prospective obstacles?

The immense wealth and resources of our country.

Improved domestic business arising from the marvelous growth of our resources and corresponding needs.

Urgent requirements of our railroads.

United States Government preparedness.

Demands of foreign countries which they are unable to supply and we can meet.

The year 1915 was one of unequalled prosperity growing out of our immense crops marketed at high prices, and tremendous exports of manufactures, munitions, food products, metals, live stock, etc. Our domestic business is rapidly increasing in volume and broadening in its range, and we may reasonably count upon its necessary requirements to provide a wide market for the sale of metal working machinery. A gratifying feature in this connection is the fact that manufacturers and dealers have been able to clean house during the past year. More or less obsolete machine tools which have been carried for a long time have found a ready market at good prices. Our railroads are proving their ability "to come back," and we can confidently look to them for a large volume of orders. Earnings have been constantly increasing and now afford a surplus with which to buy equipment, the purchase of which has been so long deferred and is

*From an address delivered at the sales conference of the Norton Company and the Norton Grinding Company, Worcester, Mass., Jan. 6, 1916. Mr. Prentiss is president of the Prentiss Tool & Supply Company, New York.

imperatively needed to handle their ever-increasing business.

The present activity in shipbuilding is marked and likely to grow during the present and future years. This industry should afford a considerable market for metal-working machinery.

It is likely that our Government in its program of preparedness will require considerable purchases of machinery covering a period of several years.

Another factor is our ability to supply the needs of the nations now at war and other countries which heretofore have depended on the warring nations for their machinery requirements.

OUR SHARE OF FOREIGN TRADE

What may we expect from foreign trade? The machine tool industry has had considerable foreign trade during the past few years, Germany having been our principal competitor and constantly gaining in the race.

Statistics compiled by George R. Wood, New York manager of the Allied Machinery Company, who has made a special study of this matter, show that in the year 1913 the United States exported to foreign countries metal-working machinery to the value of \$16,000,000. These exports, in large amounts, went in the order named, to the United Kingdom, Germany, North America, France, Russia, Belgium, Austria-Hungary, South America, Australia, Italy. Germany exported to foreign countries during the same period nearly \$18,000,000, distributed among foreign countries, according to value, as follows: Russia, France, Austria-Hungary, Belgium, Italy, United Kingdom, Holland, Switzerland. The value of Germany's exports for the first six months of 1914 was in excess of \$16,000,000, showing what strides she was making when the war began. Mr. Wood asks these pertinent questions:

Assuming that the Central Powers are prejudiced against American machine tools, will Germany be able to supply the \$3,700,000 worth of machine tools which she and Austria purchased in America in 1913?

Assuming that Germany can regain her position in Russia, will she find the United States prepared to diminish the annual business of \$3,500,000 which Germany did there before the war?

Will the United States be prepared to get any part of Germany's share of Belgium's machine tool business which in 1913 amounted to \$1,800,000?

Assuming that the Central Powers, which purchased \$3,700,000 worth of American machine tools in 1913, are not prejudiced against the United States, will we be able to take care of Germany and Austria as well as other nations which will all probably want more machines than heretofore?

Considering that Switzerland, because of the war, has not been able to make her annual purchases amounting to about \$1,000,000 worth of machine tools, will Americans be prepared for the sudden and heavy demand from that country?

A TIME OF OPPORTUNITY

The demand from the warring nations for machine tools has been so great we have been unable to make any special efforts in South America, Asia and such European countries as have not been embroiled in the war.

It is advanced on all sides by those competent to judge that our country has a great future, provided we have the grasp and courage to meet it. Ours is the only country in the world that has the available resources to meet the world's needs. It is urged that she must meet these needs: if willingly, with corresponding advantage; if unwillingly, with corresponding loss. Our manufactures are required throughout the world and will be utilized if we are willing to meet the necessary conditions, which include careful consideration of special requirements, reasonable prices, favorable terms where credit is justified, and reciprocal trade.

To sum up, we must reach out to meet the world's necessities, freely giving of our unparalleled resources whatever is needed and wherever required, on a basis of good will and liberality. Unless we are alert to take advantage of this flood tide of opportunity, and make use of our inexhaustible resources in the way of finance and trade to help ameliorate the deplorable conditions resulting from the European war, we may be caught

in the undertow of the ebb tide. For it is believed by some wise prophets that our great wealth and inflated prices may prove a lodestone to draw to our markets, through the door recently opened by our tariff revision, in great and increasing volume the manufactures of nations which have suffered through the war, as their necessities will likely force them to offer their products at prices which our manufacturers cannot afford to meet, with the inevitable result of slack times and depression.

The favorable possibilities of the future appear to exceed, in large measure, the unfavorable ones. If this be true, should not manufacturers and distributors of machine tools inaugurate and persistently follow a policy of wise optimism, so necessary in meeting unknown conditions, and thus be prepared to do their share in conserving the welfare of all?

Electrical Equipment of the Inland Steel Co.

The addition to the plant of the Inland Steel Company at Indiana Harbor, Ind., now in course of erection, will include electric drive of the main rolls. The addition will consist of eight open-hearth furnaces and blooming and finishing mills. About two years ago the Inland Steel Company installed electrical apparatus in its plate and sheet mills and the operation was so successful that when the decision was made to erect a new mill electric drive was the only form of motive power considered. A contract was awarded to the Westinghouse Electric & Mfg. Company, East Pittsburgh, covering two 5000-kw. 25-cycle 2400-volt turbo-generators complete with surface condensers, exciters and switchboards; two 1000-kw. synchronous motor-generator sets; one 15,000-hp. direct-current motor and equipment; two 8000-hp. motor equipments and several thousand horsepower of auxiliary apparatus.

The contract practically doubles in value any ever given by a steel company for electrical equipment, and is exceeded in total horsepower, but not in size of units by only one other installation.

The 15,000-hp. direct-current motor will be direct connected to a 40-in. reversing blooming mill, receiving its power from the generator of a flywheel motor-generator set. The direction of rotation of the mill motor is obtained by means of voltage control of the generator supplying it with current.

The structural mill included in the additions consists of one 32-in. reversing roughing mill and one 28-in. finishing mill of three 3-high mills. Each mill is driven by an 8000-hp. (maximum) direct-connected direct-current motor, and the scheme of control is the same as given for the blooming mill. One flywheel motor-generator set with a generator unit for each motor supplies the power for the mills, and by a special system of control and design of apparatus, the power taken from the line is equalized to practically a constant load with variations of not more than 10 per cent plus or minus, although the load on the mill motors will vary from several thousand horsepower in one direction to several thousand horsepower in the opposite direction several times a minute. The energy for the auxiliaries, most of which are direct-current motor drive, is supplied from the two 1000-kw. synchronous motor-generator sets.

New Sloss-Sheffield Furnace

The Sloss-Sheffield Steel & Iron Company, Birmingham, Ala., has let a contract for the building of a new blast furnace at Sheffield, Ala., alongside the Hattie Ensley stack now in operation. The new furnace will probably be completed by July 1. When it starts it will use the stoves, engines and boilers of the Hattie Ensley furnace. The latter will then go out for repairs and blowing engines; boilers and stoves will be added for the new stack.

Among the list of open-hearth furnaces completed in 1915, as given in THE IRON AGE, Jan. 6, 1916, p. 97, the Youngstown Sheet & Tube Company was credited with three 75-ton furnaces. The reference intended was to the Youngstown Iron & Steel Company.

THE YOUNGSTOWN STRIKES

The Labor Troubles at the Republic and Youngstown Sheet and Tube Plants

In the early part of last week, 200 or more laborers employed in the pipe mills of the Republic Iron & Steel Company at Youngstown, Ohio, made a demand for an advance in wages from 19½c. to 25c. per hour. The men are mostly foreigners, and efforts of the company to settle the trouble by conferences with them were without avail, and they went out on strike. The trouble quickly spread to other departments of the plant, and in a short time 2000 employees of the blast furnaces and Bessemer and open-hearth steel plants and the finishing mills were out on strike. This necessitated banking the blast furnaces at Haselton and shutting down both steel works and finishing mills.

There was a good deal of unrest, and the police officials at Youngstown seemed unable to preserve order. All the plants of the Republic Company were picketed, and men attempting to go to work were driven back. The trouble spread to the mills of the Youngstown Sheet & Tube Company at East Youngstown, the laborers in the various departments demanding also an advance from 19½c. to 25c. per hour.

On Thursday, Jan. 6, word was received in Youngstown of the advance of 10 per cent granted by the United States Steel Corporation to ordinary labor, and at once T. J. Bray, president Republic Iron & Steel Company, and James A. Campbell, president Youngstown Sheet & Tube Company, announced that the same advance in wages as given by the Steel Corporation would be made. The men maintained their demand for 25c. per hour.

On Thursday night and Friday rioting started, and a number of prominent buildings were set on fire and in a few hours practically the entire town of East Youngstown, including the Renner block, built only a short time ago at a cost of \$150,000, was destroyed, the loss being estimated at not less than \$1,500,000. East Youngstown and Struthers are now under military guard and saloons are closed.

In the early start of the trouble President Bray issued a statement in part as follows:

The company claims that it is now paying the highest labor rate in effect in the Youngstown district. Our present rates, in fact, are substantially in excess of the rates paid by some of our important competitors in outside districts and in no case less than the general rate. The demands of our common labor are therefore not justified by competition, and in our opinion are unreasonable. It does not seem amiss in this connection to call attention to the fact that present prosperity has been built up largely on war orders, and that business activity has been of short duration. For this company during the last two years of depression did not reduce wages, although it did pass its dividends and is now in arrears to its stockholders on its preference dividends.

By 6 o'clock Wednesday night all of the departments of the company will be shut down, throwing 6200 men out of employment. Of the working force only 40 per cent, or 2500 men, are laborers, and all the others will be thrown out of work on account of the strike of the laborers.

WORKERS' SHARES OF PROFITS 3 PER CENT AND HIGHER

On Sunday afternoon, Jan. 9, President Campbell made a statement in part as follows:

The gates will be open for the men to return to work in the morning. The wage agreement will be discussed later and will, I hope, be settled to the satisfaction of all concerned. We will not attempt to resume full operation for several days at the least. There are workmen now in the plant and more will be put to work if they apply to-morrow morning. Much work is to be done before we can resume active operations again. Our furnaces are still banked. Steam is being kept in the boilers to keep the pipes from freezing.

We do not need any protection for ourselves, but we want to have our workers, their families and their homes protected. Brig. Gen. Speaks has informed us that he will remove the troops from our plant. It was never intended that they should be quartered there. We will not import strike-breakers. This will not be necessary as soon as the workers feel that they can return to work in safety.

We will pay the laborers 22c. an hour when they return. We decided we would pay this wage when our competitors made the announcement that this would be paid their work-

men. The share of our profits we give the workers has never fallen below 3 per cent and has been as high as 6 per cent. We gave them 5 per cent for the last year, despite the depression in the steel market the first nine months.

On Monday, Jan. 10, the Republic Iron & Steel Company had not made any effort to start up its works, but is likely to do so in a day or two. Fred C. Croxton, chief of the State Mediation Board of Ohio, arrived in Youngstown on Monday morning, and at once called a meeting of officials of the Republic and Youngstown companies and the strikers. Joseph Bishop of Columbus, heretofore active in strike mediation, and James H. Nutt, labor commissioner for years of the Republic Iron & Steel Company, have offered their services in helping to settle the trouble.

On Tuesday evening, Jan. 11, the situation had quieted materially, and it was believed that the worst of the trouble had been passed. The skilled workmen and the American laborers are anxious to return to work, and are being taken back as fast as they apply for their positions. The plants of both companies are gradually starting up. Over 300 arrests have been made, of mostly foreigners, who are charged with inciting riot, plundering buildings and arson.

At the by-product coke ovens of the Carnegie Steel Company at Farrell, Pa., some of the men have gone out on strike, but it is not believed the trouble there will be serious.

All the blast furnaces in the two valleys have offered their employees the same scale of wages as offered by the Steel Corporation, with the exception that the advance is to be effective from Jan. 1. This advance, which is 10 per cent, puts common blast furnace labor at \$2.20 per day of 10 hr.

PITTSBURGH, PA., Jan. 12, 1915.—(By Wire.)—All trouble at the plants of the Sheet & Tube Company is over, as the men at a conference held yesterday agreed to accept the proposed advance of 10 per cent in wages. It is expected that the company's blast furnaces, steel works and finishing mills will all be in full operation before this week is out. It is also believed that the labor troubles of the Republic Iron & Steel Company at Youngstown will be over by the end of the week and its blast furnaces, steel works and finishing mills in operation.

Large Imports of Manganese Ore

The imports of manganese ore at Atlantic ports, as ascertained by THE IRON AGE, were 26,887 gross tons in October and 50,629 tons in November, 1915, nearly all of it from Brazil. The total for the eleven months to Dec. 1, 1915, was 251,508 tons. Of this total only 27,137 tons was imported in the first five months of 1915, the remainder, 224,492 tons, having been received between June 1 and Dec. 1, or at the rate of 37,395 tons per month for six months. The present rate is therefore considerably in excess of the averages in 1913 and 1914, which were 28,757 tons and 23,608 tons respectively. It also compares with 22,470 tons per month for the five years, 1910-1914.

Magnesite Available from Greece

No difficulty is experienced now in obtaining permission for shipments of magnesite from Greece to the United States, but the name and approximate date of sailing are necessary for application, according to a cablegram to *Commerce Reports* from the American legation at Athens, Greece.

Magnesite, caustic, lightly burned or dead burned, has been added to the embargo list of Great Britain. The exportation of silica bricks and of copper and its alloys are also prohibited to all European countries except France, Russia, Italy, Spain and Portugal.

The Illinois Steel Company placed the 22-in. mill in the Bay View (Wis.) plant in operation on Jan. 8, resumption having been unavoidably delayed for a week. The crew consists of 140 men and the mill is working on structural material.

ESTABLISHED 1855

THE IRON AGE

EDITORS:

GEO. W. COPE

A. I. FINDLEY

W. W. MACON

CHARLES S. BAUR, *Advertising Manager*

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Our Half-Yearly Index

The Index of THE IRON AGE for the past half year, July to December, inclusive, has been compiled and printed and is now ready for distribution. It will be forwarded promptly to those who have entered their names on our list as desiring it. Others who may have use for copies will be furnished them by addressing our Circulation Department.

An Explanation

It is reported to this office that in a number of cases, particularly in Chicago, delivery was not made through the postoffice, of the Jan. 6 issue of THE IRON AGE. Instead, subscribers were asked to call for the package, under the postmaster's ruling that it was too large to be delivered by carrier. We regret the annoyance to which any of our readers may have been put in this way. Where cases have been reported to us, we have promptly taken steps to have the delivery made by special messenger. The Review Number of THE IRON AGE comes but once a year and there has been no purpose on the part of the publishers to make it of an undeliverable size. In fact, definite limitation was put upon the number of advertising pages accepted for that issue. That it should have exceeded the number of pages in any previous Annual Review Number is simply an index of the exceptional conditions prevailing in the iron and steel and machinery trades. Even prosperity has its burdens; but we believe the value of the Jan. 6 issue as an exhibit of the present unparalleled status of the great industries represented by THE IRON AGE will far outweigh any inconvenience attaching to its distribution.

On the Continuance of Prosperity

It is good proof of the need of such caution, that the conservative counsels of Chairman Gary, in his comment on the business outlook, published last week, should have provoked such criticism and in some quarters even resentment. There would be something wrong about the locomotive engineer or the ship's captain who showed temper at rules requiring careful going under conditions of great difficulty and possible danger, particularly conditions he had never met; but the average man would

not think of finding fault with such rules. Just now there are reasons for the irritation shown on the lower end of Manhattan Island at the suggestion that the ending of the war may interrupt easy money-making.

The fact is that Judge Gary expressed the belief nearly three months ago, at the meeting of the American Iron and Steel Institute, that peace in Europe would change the prosperous aspect of American business. He said at that time:

Personally, I do not agree with the statements which have been made that at the close of the war we may expect in this country a prolonged continuance of the great prosperity now experienced; especially if we do not have protection against the results of cheap labor and the impoverished conditions abroad, which are inevitable.

With scarcely an exception, the men of prominence in industrial, financial and railroad operations who were quoted in the various review and outlook articles published at the opening of the year, called attention to the possible interruption to business activity involved in the readjustments of peace. The score of leading steel manufacturers who wrote in THE IRON AGE of Jan. 6 on the same question all pointed out that when peace came the American steel trade would have problems to deal with which might change its present prosperous aspect. It is fair to say that the following paragraphs in Judge Gary's utterance of last week would be indorsed by practically all iron and steel manufacturers of the country, so far as they refer to conditions to be looked for in those trades after the war:

But whenever the war shall close the business of this country will be confronted with new conditions. The purchasing power of the whole world will have been greatly reduced. Foreign countries who are now buying our products, because compelled, will withdraw their patronage in a large measure. Other non-producing countries will find their financial resources and credits lessened. More than this, foreign producers, in great need, will strive more diligently than ever to supply the countries that are financially able to pay and at prices based upon cheap labor and low cost, as they have a perfect right to do.

Our producers, including our wage earners, will find themselves in commercial antagonism with the most persistent and difficult competition ever experienced, unless this shall be prevented by laws that are reasonable and sufficient. Most of the foreign producing countries, and quite likely all of them, will be

thoroughly protected by tariff provisions, and we should be on a parity with them in this respect.

I hope and believe whatever political party is in power much thought will be given to the all-important question of adequate—no more and no less—protection. Our people will succeed or fail together. No class can long prosper at the expense of others. No class can long continue in adversity without similarly affecting all others.

Reasons for the belief of iron and steel manufacturers that they may meet severe European competition in their own territory following the war have been given repeatedly in our discussions of this subject. One fact looming up above all others and fresh in the mind of every man in the industry is that the American steel trade was seriously depressed in the months preceding the placing of enormous war orders here. On the Pacific coast our steel manufacturers practically lost their footing because of the low prices of imported steel products. Whenever these conditions of the recent past are recalled, instant reassurance is given from certain newspaper and Administrative sources that there is nothing to fear. From the same sources the country was told when the last tariff act was passed—an act definitely designed to produce lower prices and larger imports of steel products—that our industries would be put on the high road to successful operation, having at last been unshackled and endowed with a new freedom. The same sapient advisers might as well have told the railroads when their labor cost was advancing with every year, revenues were declining and receiverships for many were ahead, that all would be well if they faced the future with courage and ceased from pessimism. That is substantially the advice they are offering the steel industry to-day. It is not surprising that the leaders in that industry, facing the responsibilities of a situation that has no parallel, are not carried away by the easy optimism of impractical phrase-makers. They are not thinking in maxims and platitudes, but in terms of a very concrete problem. It is the problem created by wages on a scale nearly three times as high for common labor as the lowest rate paid in the depression of the eighteen-nineties, and at the same time the possibility of prices, fixed by German competition, fully as low as those which brought them to the verge of disaster in 1914.

First in Electric Steel

That the United States has now attained first position in the electric steel industry of the world is a matter of no small significance. Until now Germany has had this distinction. A year ago that country had 46 electric furnaces in the steel industry and this country was credited with 41. At present the United States has 73 against Germany's 53—a striking reversal of positions.

Only three or four years ago predictions were common that this country would not make great headway in producing electric steel. It was argued that the cost of electricity and hence of the steel would be too high. This seemed plausible then, but there has been a great change in conditions. The war has created a demand for certain kinds of steel, formerly obtained from Europe, which only the electric furnace could satisfactorily produce.

It is also true that the need of steel of higher quality in the automobile and other industries has been compelling recourse to the electric furnace. This has been a more gradual development, but has been especially emphasized in the past year.

From a tonnage standpoint also it is probable that the United States is now in the lead in electric steel, though Germany in recent months has increased her output very materially. It should be noted, however, that 16 of Germany's 53 furnaces are melting ferromanganese and hence are not a factor in actual steel output. But the economy and importance of this phase of electric furnace operation should not be overlooked. In this country only two electric furnaces are now used in this way.

A striking feature of the expansion in this country as well as in the world is the rapid strides made by the arc type of furnace. There are now more than twice as many in the United States as were reported one year ago, or 68 against 33; while the induction furnace is credited with no advance, the total still being 6. Outside of the United States and Canada there are now 179 arc furnaces, against 140 a year ago, an increase of 39, while the induction type has 5 more than a year ago, or 35 in all.

The indications are that the new world position of the United States will not only be maintained in 1916, but probably further advanced. While 41 of the 73 furnaces in this country are now making steel castings, the adaptability of electric melting to the special steel and malleable castings industries is gaining recognition; it is not unlikely, moreover, that a continuance of the high price of crucibles, due to the war, will force a wider use of the electric furnace, with its added refining advantages, in the crucible steel industry. Nor should the fact be lost sight of that, as a medium for the refining of hot metal from the open-hearth or the Bessemer converter, its possibilities are likely to gain more practical recognition as the industry develops and the demand for higher grade steel increases.

Pig-Iron and Open-Hearth Additions

The exhaustive summary printed in THE IRON AGE last week, of new construction in progress in the iron and steel industry, contained two facts of outstanding importance: that there is new construction of open-hearth furnaces representing an annual capacity of 4,265,000 tons of steel ingots, and that eleven new blast furnaces, with 1,750,000 tons annual capacity, are being built.

Assuming that 25 per cent of the steel ingot as cast will come back to the open-hearth furnace, the 4,265,000 tons of open-hearth steel ingot capacity becomes about 3,200,000 tons of raw material, pig iron and scrap, required. The blast furnaces under construction will fall 1,500,000 tons short of meeting the requirement.

A fortnight ago, before the full summary of the new construction program was available, we discussed the question "Are more blast furnaces needed?" chiefly from the viewpoint that pig iron had become scarce, as well understood in the trade, and as shown by the rapid advances in prices that occurred during the month of December. Bessemer

iron, the most conspicuous example, advanced \$3.50 practically within the limits of the month. It appeared that the iron and steel industry as a whole had been growing but slowly since the new construction program of 1907 was completed, and much more slowly than it had grown previously. It also appeared that while the blast furnaces were making more pig iron than they had been thought capable of making, many of them breaking all their previous records, and while the iron foundry industry was not taking the tonnage of iron it takes when it is really active, the balance between pig iron and steel was a delicate one.

The times are of course out of joint. The demand for iron and steel has come with unprecedeted suddenness. Manufacturers are prompted to adopt any expedient to increase their output, there being no time for forming well rounded out plans of extensive new construction, and certainly none for putting them into execution. It would be idle to contemplate the erection of a complete works, with blast furnace, steel unit and finishing mills. The new open-hearth furnaces being built are widely distributed. A few have attendant blast furnaces under construction, but in the main the blast furnaces will not contribute pig iron as soon as the open-hearth furnaces will be ready to take it. In four cases open-hearth furnaces are being added at plants that have hitherto sold pig iron, while in other instances open-hearth furnaces are being built apparently to use purchased pig iron.

Prices of steel have shown great flexibility in their advancing tendency, and as pig iron lagged far behind the procession until quite recently it has been natural enough to assume that the thing to do was to increase steel making capacity and take chances on securing pig iron. No dead level has been fixed beyond which steel price advances would be viewed with particular alarm. The various markets are expected to adjust themselves to physical conditions. It now seems by no means improbable that pig iron will undergo an adjustment that will materially lessen the spread between it and unfinished steel.

Scrap is always a more or less unknown quantity; but there is no good reason for assuming that the outcome of scrap will be increased. Thus far heavy melting steel in the Pittsburgh district has hung more closely on the heels of basic iron than it usually does in general advances of like extent. What is written by market prices is that scrap is now as scarce as pig iron. In the case of scrap, as was the case somewhat earlier with pig iron, stocks have been drawn upon, for without question mining and various other industries have held scrap during the period of low prices, to take advantage of an advance such as has now come. The burden of increased raw material requirements of open-hearth furnaces will have to be borne by the blast furnace. By far the most important of the Steel Corporation's new construction recognizes this condition, for it involves the establishment of duplexing departments at the South Chicago works and at Gary, while at Gary four blast furnaces are to be built.

There are quite a number of blast furnaces scattered throughout the country, now idle and for years thought to have made their last pig iron. In

an extremity they may be able to join the ranks of producers, but so much must be done to put them in productive position that the temptation of quite high prices would undoubtedly have to be presented. The pig-iron market of the next few months will certainly bear close watching.

New High Point in Wages

The steel trade had scarcely started on the new year when it found itself face to face with a labor situation on which action was taken with a promptness never equaled. Probably no steel manufacturer has commented on the prospects for 1916 in the past few months without referring to the possibility of labor shortage. That common labor was likely to be scarce before the end of the year was a frequent prediction in the summer of 1915. But winter came on without serious development, and labor calculations began to center about spring, when the adjustment of coal mining wage scales comes up. The holiday celebrations, however, brought unusual interruptions in some quarters and showed that the phenomena generally looked for in the spring were already present. At Youngstown a few leaders of the type that has turned several New England centers upside down were able to bring on a strike, and the strike once started flamed up quickly into a riot, with loss of life and property, the maiming of many and the calling out of troops to protect workers and mills.

The week's events have shown again that industrial operations, particularly in the iron and metal working trades, are now carried on in this country under conditions so unprecedented as to make the ordinary manufacturer's experience of little value as a guide. It was assumed by some employers that as wages at steel works have been the highest ever paid and since the leading companies made no reduction in 1914, when with steel prices at the bottom some of them passed their dividends and even showed losses, the workers would be satisfied to go on for a time, while the companies made up some of their losses. But every such calculation went down before the fact that large numbers of unskilled men of an indispensable class of labor in steel making had been drawn out of the country into European armies, and the other fact that the huge war contracts have caused such a competition for workers of every degree of skill as has never been known in American shops.

Following promptly the announcement of an advance in wages to Steel Corporation workers in mines, furnaces and mills, amounting, for common labor, to 10 per cent, there have been similar advances by independent companies. Common labor on the new basis, at 22 cents an hour, will receive \$2.64 for a 12-hr. turn—the highest rate ever paid in this country, and, it is needless to say, in any other, in such employment. Merchant blast-furnace companies also have made advances in the past week and most of them are now paying the highest rates in their history. In the depression following the panic of 1893, common labor in some employments in the iron industry, including surface work at some Lake Superior iron mines, received as little as 90 cents a day, or only one-third the new steel works wage for unskilled men.

The present is no time for steel manufacturers to govern their moves in respect to wages by what may happen when the stimulus of war buying is gone and steel makers the world over struggle with the uncertainties of readjustment. It is argued that immigrants from Europe, escaping from the privations of the years following the war will come here in large numbers; also that the warring countries will prevent emigration, thus leaving the present scarcity of immigrant labor unrelieved. What is certain is that for some months to come this scarcity will continue.

In one industry, that of coal mining, on which all manufacturing operations depend, a wage adjustment is but a few months away. It behooves those responsible for this settlement to take a leaf from the experience of the iron and steel trades and, in this wholly unprecedented situation, to consider early how their differences can be adjusted. Both sides need to appreciate that the responsibilities resting upon them this year are greater than ever. An attitude by miners or operators which does not take account of the great outside interests involved could easily create a situation little less than calamitous.

Secretary Redfield Commends the American International Corporation

To enable the officers and directors of the newly organized American International Corporation to meet Secretary of Commerce Redfield, W. L. Saunders, chairman of the board of the Ingersoll-Rand Company and a director of the new corporation, gave a luncheon Jan. 6 in honor of Secretary Redfield at India House, New York. The guests besides Mr. Redfield were Charles A. Stone, president of the corporation; Beekman Winthrop, Robert F. Herrick, Charles M. Muchnic, Ambrose Monell, F. A. Vanderlip, Theodore N. Vail, Willard Straight, R. P. Tinsley, Charles A. Sabin, O. H. Kahn, William Woodward, E. S. Webster, J. P. Grace, Dr. H. S. Pritchett and W. E. Corey. In introducing Secretary Redfield, Mr. Saunders said:

"I have asked the officers and directors of the American International Corporation to meet Secretary Redfield here because I believe in the wholesome influence for good in the spirit of co-operation between the government and business. It seems to me that the common cry that business should be separated from politics is fallacious; that the very opposite is what we should strive for, and that the chief point about which we should be concerned is the nature of the contact between government and business—whether it is one seeking special privilege and done in secret or whether it is a broad, general open spirit of co-operation."

Secretary Redfield said he believed that American business and administrative interests were passing into a stage where co-operation is to be the law. He told how through co-operation three industries had been launched in this country in the past year. Referring to the announcement that Bolivian tin ores are to be smelted near New York harbor, he said this outcome was the result of ten months of constant work by United States representatives in Bolivia and in Washington. He referred also to the manufacture of porcelains from domestic clays and to the dressing and dyeing of furs. For the former Germany was heretofore depended upon and for the latter London. Of the American International Corporation Mr. Redfield said: "I think you have taken the greatest step forward in American history. It is one of the greatest acts of vision and courage I have ever known, and one for which we have waited for years."

The furnace of the Donner Steel Company, Buffalo, N. Y., was blown in Dec. 31.

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PERSONAL

Andrew Carnegie has gone to Miami, Fla., to spend the winter.

The accompanying reproduced photograph is of I. Lamont Hughes, whose advancement to the assistant general superintendency of the Youngstown district of the Carnegie Steel Company was announced in last week's issue. As then stated, he started with the company 18 years ago.



I. LAMONT HUGHES

David Tod, president of the William Tod Company, Youngstown, Ohio, announces changes among officials of the company as follows: L. A. Woodard, general manager, retires from the duties of vice-president and director, and S. Sherley French, assistant general manager, succeeds him, taking full charge of the plant operations. R. D. Day, who has been connected with the sales department, becomes general sales manager. About four years ago L. A. Woodard succeeded I. H. Reynolds as vice-president and general manager of the William Tod Company, being promoted from works manager. Mr. French was for some years chief clerk at the plant of the Brier Hill Steel Company, and went to the Tod Company about four months ago as assistant to the general manager.

As forecasted in THE IRON AGE of Jan. 6, James M. Buick, second vice-president of the American Car & Foundry Company, has been elected first vice-president, and as general manager of the company will move back to St. Louis from Chicago the managerial offices which were transferred to Chicago when E. F. Carry was chosen to the position which Mr. Buick now holds. The presidential and fiscal offices under President F. H. Eaton will be continued in New York and the sales office in Chicago. Herbert W. Wolff, who has been assistant to Mr. Buick, has been made vice-president in charge of sales and will remove to Chicago.

Oscar U. Cooke, for some time inspector of finished and semi-finished steel at the Upper and Lower Union mills of the Carnegie Steel Company at Youngstown, Ohio, has been appointed inspector for the entire Youngstown district, which includes the Ohio works and blast furnaces and Upper and Lower Union mills

at Youngstown, and the Greenville bar mills at Greenville, Pa.

D. H. Teas, sales engineer Niles-Bement-Pond Company, New York, sailed for Buenos Aires, Argentina, Jan. 8. He will visit Chile before returning home.

E. F. Walker, formerly manager of the water works department of the International Steam Pump Company, and until recently Eastern representative of John H. McGowan Company, has connected himself with the National Transit Pump & Machine Company, Oil City, Pa., as representative in eastern New York, New Jersey and the New England States, with headquarters at 30 Church Street, New York. The National Transit Pump & Machine Company was formerly a subsidiary of the Standard Oil Company.

A. E. Meggs has resigned his position of New York manager for the L. S. Starrett Mfg. Company to enter the sales department of Flint & Chester, Inc., 237-239 Lafayette Street, New York, effective Jan. 15. He had been with the Starrett Company for fourteen years, in different capacities.

E. V. Babcock, Pittsburgh, representing the so-called Replogle party, has been elected a director of the Cambria Steel Company, succeeding Effingham B. Morris, of Philadelphia, who has resigned. At the same meeting Arthur E. Newbold was elected chairman of the executive committee to succeed Mr. Morris, and Powell Stackhouse was elected to the executive committee.

Alva C. Dinkey, president of the Midvale Steel Company, has been elected a director of the Philadelphia National Bank.

William A. Heartt, formerly Western sales manager for the Sard Mixing Machine Company, New York, has joined the Chain Belt Company, Milwaukee, as assistant sales manager. Mr. Heartt was introduced to the Chain Belt organization at a banquet in the University Club, Milwaukee, on Jan. 3.

Theodore Marburg, president Marburg Bros., New York, importers of ball bearings and magnetos, has returned from Sweden.

Gottfried Janson, of Axel Rydan, Stockholm, Sweden, importer of machinery, recently arrived in New York.

Harry Miner, for some years Paris representative of the Landis Tool Company, Waynesboro, Pa., has returned to this country.

Edgar E. Jamison, dealer in tool and alloy steels, has removed his office and warehouse from 515 Mission Street to 154 First Street, San Francisco, Cal.

A. F. Stirling Blackwood resigned Dec. 31 as vice-president and manager of the Michigan Steel Casting Company, Detroit, Mich. Under his management the company's plant grew from a small crucible foundry to one of the largest small steel casting foundries in the United States. His address is 919 Jefferson Avenue, Detroit.

Glen B. Hastings, Chicago, has been appointed by Hamilton & Hansel, New York, to represent the Rennfelt electric furnace interests in the Chicago district. He is located at 1511 and 1512 Lytton Building.

Walter J. Freidlander, president Hisey Wolf Machine Company, Cincinnati, Ohio, has been appointed safety director of the city by Mayor George Puchta.

Harry W. Bolens, president, and Olaf Elton, vice-president, Gilson Mfg. Company, Port Washington, Wis., malleable iron foundry and gasoline engine works, have purchased the holdings of the Gilson family in the company. The Gilson Company was organized in 1891 by John Gilson, Sr., and Mr. Bolens for the manufacture of gasoline engines. For some years the company has also produced castings for office chairs made under patents held by Mr. Bolens, who is president of the Wisconsin Manufacturers' Association.

Louis G. Henes, Pacific coast representative of Manning, Maxwell & Moore, is leaving for a month in the East.

On New Year's eve the employees of the Champion Tool Works Company, Cincinnati, Ohio, presented President H. W. Kruesberg with a loving cup. The presentation speech was made by one of the workmen, who

congratulated Mr. Kruesberg on his ability to work in such close harmony with his employees. The company presented each of the employees with a leather purse containing \$10.

H. G. Stott, superintendent of motive power of the Interborough Company, New York, has been appointed a member of the board of trustees of the United Engineering Society, which operates the Engineering Societies Building in New York City.

Dr. W. F. M. Goss, University of Illinois, has been appointed representative of the American Society of Mechanical Engineers on the Board of the Engineering Foundation, brought about in 1914 through the donation of Ambrose Swasey, Warner & Swasey Company, Cleveland.

J. N. Caughell, who was formerly chief engineer of power plant with Dodge Brothers, Detroit, has accepted the position of mechanical superintendent of the United States Department of Agriculture, Washington, D. C.

L. E. Perkins, mechanical engineer at the Addyston works of the United States Cast Iron Pipe & Foundry Company, has been made assistant superintendent at the company's plant at Bessemer, Ala.

Louis A. Leavitt was elected treasurer and director of the American Kalamein Works, Inc., Brooklyn, N. Y., which makes metal covered doors and windows.

Samuel Stoneham resigned Dec. 31 as superintendent of the Michigan Steel Casting Company, Detroit, Mich. His address is 116 Hendrie Avenue, Detroit.

Richard L. Thomas, late vice-president, has been elected president of B. M. Jones & Co., Inc., tool steels, Yorkshire iron, etc., Boston, and Walter J. Klein becomes vice-president and continues as treasurer. Both have for many years been associated in the directorate and with the sales and office management of the company.

Jacob D. Waddell, Niles, Ohio, who recently resigned as manager of sales of the Brier Hill Steel Company, Youngstown, Ohio, is giving his attention to the project of building a new sheet mill either in Niles or Youngstown, Ohio. Mr. Waddell will have associates with him in his new project, and definite announcement of it will likely be ready within two or three weeks.

The American Sheet & Tin Plate Company announces that, effective Jan. 1, W. L. Goodhue has been appointed district manager of its Dover, Ohio, district, succeeding T. J. Haley, transferred. J. C. Griffin succeeds Mr. Goodhue as manager of the Laughlin works and J. A. Butler has been appointed manager of the La Belle works, succeeding Mr. Griffin.

On Monday evening, Jan. 10, at Youngstown, Ohio, Joseph G. Butler, Jr., and his wife celebrated their golden wedding anniversary. They were presented with a loving cup by friends.

William H. Carpenter, until recently superintendent of the Bristol Brass Company, Bristol, Conn., has accepted a position as manager of the Mayo Radiator Company, New Haven, Conn.

To Handle Railroad and Industrial Equipment

Announcement is made of the incorporation of Atkinson & Utech to conduct a business in railroad and industrial supplies and iron and steel products, with offices at 111 Broadway. Lloyd H. Atkinson, who is president of the new corporation, was for several years rails sales agent of the Bethlehem Steel Company. John J. Utech, vice-president, was formerly connected with the Carnegie Steel Company, later with the American Steel Foundries, and for the past six years with the Alliance Machine Company as manager of its New York office. The company is negotiating to represent several manufacturers in its line in addition to those with whom arrangements have been made.

The Keystone Truck & Crosstie Company, Pittsburgh, has been granted a Delaware charter to manufacture, sell and deal in railway appliances, including crossties, rails, etc.

The Carnegie Steel Company's Annual Dinner

The nineteenth annual dinner of the officials, sales managers and operating heads of the Carnegie Steel Company was held in the Hotel Schenley, Pittsburgh, on Saturday evening, Jan. 8. James A. Farrell, president of the United States Steel Corporation, was a guest, arriving in Pittsburgh on Saturday morning, when he with W. P. Palmer, president; C. L. Miller, vice-president and general manager and other officials of the American Steel & Wire Company, visited the new zinc plant of that company at Donora, Pa.

A total of eighty-eight men connected with the Carnegie Steel Company and the United States Steel Corporation attended the banquet, some of the sales managers being present from distant cities. James H. Reed, who was to have been toastmaster, was too ill to attend, and his place was taken by L. H. Burnett, assistant to the president of the company. Col. Henry P. Bope, vice-president and general manager of sales, who was to have talked on the subject of "National Preparedness," was also too ill to attend.

The first address was made by President Homer D. Williams, on "Mechanical Preparedness." Speeches were made by William P. Siebert, sales manager of the billet and rails sales bureau, on "Commercial Preparedness"; Louis C. Bihler, traffic manager, on "Transportation Preparedness," and Dr. William O'Neil Sherman, chief surgeon of the company, "Medical and Surgical Preparedness."

Domhoff & Joyce Sales Forces Meet

The annual meeting of the sales forces and representatives of allied interests of the Domhoff & Joyce Company was held in Cincinnati, Dec. 29 and 30. The business discussions took place in the general offices of the company each afternoon. On the first evening there was a theater party and the second evening the annual dinner was given at Heidelberg, Ky. At this function John Sargeant, president of the company, was the recipient of a fine desk set, a gift from the employees. The dinner was given over to social features.

Those present were: John Sargeant, president and treasurer; Charles A. Sargeant, secretary; J. D. Morten, sales manager; C. H. Jenkins and R. D. Jenkins, Chicago; W. H. Underwood and J. E. Shaw, St. Louis; W. T. Morris and J. C. Gore, Indianapolis; A. H. Vollmer, Cleveland; G. K. Connelly, S. T. Story, C. H. Domhoff, A. C. Cole, T. J. Joyce, C. Hayward, S. Borreson, A. Willis Cobb, Earle Seale and A. Harthorne, Cincinnati; H. H. Sargeant, Charleston, W. Va.; H. S. Calcutt, Covington, Ky.; E. Foster, Al. Peters, A. J. Underwood, and W. H. Frillman, Cincinnati; E. G. Lohmeyer, Newport, Ky. Mr. Sargeant has large interests in the Milburn Coal Company and it was represented by P. M. McGlahanan, president. The Ideal Washed Gravel Company, Dayton, Ohio, of which Mr. Sargeant is president, was represented by Frank Brandon, Lebanon, Ohio, its secretary.

The Advance-Rumely Company, Laporte, Ind., has formally taken over the property of the M. Rumely Company. The company will continue to manufacture grain separators, steam and oil-pull tractors and other farm machinery. Officers and directors of the new company have been elected as follows: Finley P. Mount, president; John H. Guy, vice-president and general manager; H. Berger, secretary and comptroller. The directors are John W. Platten, M. N. Buckner, Lewis L. Clark, Howard C. Smith, Elisha Walker and H. H. Wehrhane, New York; F. N. Close, Crawford, N. J.; Finley P. Mount, Laporte; Stephen B. Fleming, Ft. Wayne; Stephen S. Stratton and Edgar Elliott, Chicago. The plants in Laporte, Battle Creek and Toronto will be operated. Those at Richmond and Stillwater will be sold.

The International Oxygen Company announces that on Jan. 1 it adopted the eight-hour day at its works at Newark, N. J.

OBITUARY

CHARLES C. SCHNEIDER, one of the long time prominent bridge engineers of the world and one who had much to do with forcing rational engineering design in bridge construction, died at his home in Philadelphia Jan. 8, aged seventy-two years. For about ten years he had been consulting engineer of the American Bridge Company, following about four years as chief engineer and vice-president, and he became identified with the American Bridge Company through the acquisition of the Pencoyd Iron Works, of which he was chief engineer. He was president of the American Society of Civil Engineers in 1905 and twice won that association's Norman medal and in 1886 the Thomas Fitch Rowland prize. The last was bestowed for a paper on the "Cantilever Bridge at Niagara Falls" and the medals were awarded in 1905 for a paper on "Structural Design of Buildings," and in 1908 for a paper on "Movable Bridges." He was born at Apolda, Saxony, Germany, in 1843. At an early age he entered a machine shop, where he served his apprenticeship as a preliminary to his engineering education at the Royal School of Technology at Chemnitz, from which he was graduated in 1864. Three years later he came to America and served as a draftsman and designer in the Rogers Locomotive Works, Paterson, N. J., until 1870. He next went with the Michigan Bridge & Construction Company, Detroit, and three years later entered the office of the chief engineer of the Erie Railroad at New York. In 1876 he was engaged to pass upon plans for a bridge across the East River to connect Long Island City with New York, and upon the completion of this entered the employ of the Delaware Bridge Company. In the latter part of 1877 he opened an office as consulting engineer in New York City and from 1879 to 1883 he was actively engaged in bridge design. During this period he designed the anchorage for the Statue of Liberty in the New York harbor. He became chief engineer of the Pencoyd Iron Works in 1886. In 1893 he designed a second bridge across the East River to give the Long Island Railroad a terminal in New York City, but on account of the death of the president of the railroad company, this project, like the earlier one, was abandoned in 1893 after considerable work had been done on foundations and piers and a portion of the material rolled by the Pencoyd Works. He was a member of the American Society of Civil Engineers, American Railway and Maintenance of Way Association, American Society for Testing Materials, Verein Deutscher Ingenieure and the Engineers' Club of New York.

WILLIAM F. BONNELL died in New York Jan. 8, aged 53 years. For more than 25 years he had been well known in the iron and steel trade of the Central West. Born in Bradford, England, he came to the United States in 1880. For some years he was connected with the bar iron industry at Youngstown, Ohio, where his uncle was one of the founders of the Brown-Bonnell Iron Company. Mr. Bonnell was treasurer of the Mahoning Valley Iron Company, Youngstown, at the time of its absorption by the Republic Iron & Steel Company in 1900. Later he represented the Jones & Laughlin Steel Company at Cleveland, being at the time a member of the firm of Otis, Bonnell & Co., iron and steel selling agents. In 1914 Mr. Bonnell became general sales agent of the Algoma Steel Company, Sault Ste. Marie, Ontario.

OLIVER C. GAYLEY, vice-president of the Pressed Steel Car Company, died at his home in New York City, after an illness of some months. He was born in 1860 at Nottingham, Md. He was employed for eight years in the engineering department of the Pennsylvania Railroad, and later was a division engineer of the Philadelphia & Reading Railroad. He was connected with the Safety Car Heating & Lighting Company for many years and was a director of that company at the time of his death. He was the brother of James Gayley, inventor of the Gayley dry blast for blast furnaces and former first vice-president of the United States Steel Corporation.

GEORGE H. CUSHING, superintendent of the North and South plants of the H. B. Smith Company, Westfield, Mass., died Jan. 6, from pneumonia, aged 55 years. He was born in Worcester, Mass., but while he was quite young his parents moved to Westfield. In 1884 he was graduated from the Worcester Polytechnic Institute. For a number of years he was assistant superintendent of the H. B. Smith plants, then filled the position of superintendent of a pump plant at Seneca Falls, N. Y., for thirteen years, was in charge of a foundry at Montreal, Canada, for two years, returning to Westfield in 1906 to assume the duties of the position which he held at the time of his death. He took an active interest in both public and religious affairs and was prominent in the Young Men's Christian Association. He was a man of culture and versatility, readily turning from mechanical subjects to higher literature, while his ability as a speaker brought him in constant demand at all kinds of gatherings. He leaves his widow, a son and a daughter.

WILLIAM S. GRANGER, former president of the Granger Foundry & Machine Company, Providence, R. I., died at his home in that city Jan. 1, after an illness of several months, aged 71 years. He was born at Pittsford, Vt., and was educated at Brown University. In 1866 he became treasurer of the Cove Foundry & Machine Company, Providence, which was succeeded by the Granger Foundry & Machine Company, with Mr. Granger as president. The company was merged into the Textile Finishing Machinery Company in 1902, and he retired. At the time of his death Mr. Granger was a director of the American Wringer Company and a number of insurance companies.

A. W. SPRAGUE, for many years sales manager of the woven wire fence department of the American Steel & Wire Company, died at his home in LaGrange, Ill., Dec. 29, aged 59 years. He was known all over the country in the above capacity, which he resigned some years ago to become president of the DeKalb Fence Company and later sales manager of the post department of the American Steel & Wire Company, which was his position at the time of his death. He was born in Wesbech, England, and came to this country at the age of eight years. His connection with the wire industry began when as a young man he entered the employ of the Ellwood Fence Company, DeKalb, Ill.

WILLIAM A. COMSTOCK, president Cleveland Wire Spring Company, Cleveland, Ohio, died Jan. 9 as a result of injuries sustained by being struck by an automobile. He was born in Providence, R. I., and was seventy years of age. After being connected with the old Cleveland Rolling Mill Company for a number of years in its Chicago office, he went to Cleveland, where he became secretary and treasurer of the Cleveland Wire Spring Company, which position he held until two years ago, when he was elected president to fill the vacancy made by the death of R. C. Moodey.

CHARLES L. JONES, second vice-president of the Falk Company, Milwaukee, and his 13-year-old son, Alfred Cary Jones, were instantly killed on Jan. 6 when the automobile in which they were riding crashed through the railing of a Northwestern Railroad bridge at Milwaukee in trying to avoid striking another automobile. He had been associated with the Falk Company since 1900, and as second vice-president was in charge of the sales department of the steel foundry.

ARTHUR GALE JOHNSON, of Isaac G. Johnson & Co., Spuyten Duyvil, New York, makers of steel castings, died at his home, Jan. 6, aged 54 years. He graduated from the Columbia School of Mines, lived in the West for several years and then returned to New York to become general manager of his company. He leaves his widow, two sons and a daughter.

JOSEPH BIALOSKY, one of the oldest and best known scrap-iron dealers in the Central West, died at his home in Cleveland, Ohio, Jan. 8, aged sixty-four years. He founded the Cleveland Iron & Metal Company forty-one years ago and twenty years later established the firm of Bialosky Brothers, with which he was associated actively with his sons at the time of his death.

CORRESPONDENCE

Machines Needed in Shell Making

To the Editor: In reference to the scarcity of lathes and other machine tools required for fitting up munition plants, and especially those plants in which the making of shrapnel is the principal work, there has been such a frantic, high-tension scramble that in many instances the purchasers have bought from two to five times the amount of machine tools necessary for their schedule requirements, simply because they have, in their haste to equip, failed to give proper time and thought to the adequate tooling of the lathes, etc., which would give them the greatest output per machine tool purchased.

As proof of this statement I will call the reader's attention to the Dec. 2 issue of THE IRON AGE and to the article entitled "Single Purpose Machines in Shell Making" by C. A. Tupper, wherein he states the number of various pieces of equipment required for an output of 100 3-in. shrapnel per hour.

In this article Mr. Tupper states that it requires from 12 to 20 lathes to rough turn 100 per hour—or that the output will be about five or six per machine hour.

As the writer quite recently completed the tooling up of a 20-in. common engine lathe on which the operator is easily performing the rough turning of 40 shells per hour—400 per day—it seems incredible that anyone should purchase 12 to 20 lathes to perform this operation on 1000 pieces per day.

As to banding in presses, Mr. Tupper states, in the equipment table given on page 1288, that it requires two presses, for 100 shells per hour, when in fact one geared press will easily put on the bands at the rate of 6 per minute—360 bands per hour.

W. H. CHAPPELL.

New York, Dec. 27, 1915.

To the Editor: I have read with interest the letter from W. H. Chappell, with reference to the rough turning of shell bodies, and I do not doubt that he has been able, in the case cited, to improve greatly upon the production figures indicated by my article on single purpose machines printed in your Dec. 2 issue.

The latter was purposely made very conservative, as all such articles should be, and the estimates given were intended to come within the range of a great variety of local conditions, including numerous possible contingencies which often do not receive sufficient consideration. "Better safe than sorry" is a maxim which munitions manufacturers have found a good one to go on.

The writer's first draft of this article, based upon the work done in a number of very efficient shops, would have much more nearly met Mr. Chappell's views; but when submitted to acquaintances who have been most active in the munitions industry, the time allowances indicated evoked so much criticism that they were materially modified in the final draft, so as to conform to general conditions.

Mr. Chappell's own reference to the need of only one press for banding is an illustration of the danger of allowing enthusiasm to overbalance judgment. Granting that one press will do the work, how is a spare unit to be provided? In munitions work it is particularly important to make liberal allowance for spare machines of all kinds, and all auxiliaries to the main equipment ought to be duplicated.

With machine tools especially adapted to the work, with the best of jigs and fixtures, with first class tooling, with the proper grades of cutting steel, with grouping of equipment, conveying of material and methods of handling that eliminate any loss of time between operations, with time studies systematically applied, with skilled labor, with entirely conscientious and cordial co-operation between men and management, with competent superintendents and foremen, with constant vigil-

lance in the repairing, tuning up and general maintenance of the machines, with no more than minor accidents, with no fires or other disasters, with absence of labor troubles, with no delays in receipt of forgings or other material, and with nothing to mar the perfect harmony of an ideally equipped and managed plant, the quantity of apparatus required can be reduced to the minimum. But where any of these truly desirable conditions are lacking or may not hold out over the contract period, the allowances should be made accordingly.

The figures given in the article are only a general guide and they will naturally be modified for individual cases just as the conditions would appear, on mature judgment, to permit. I do not know, however, of any munitions manufacturer who has thus far "bought from two to five times the amount of machine tools necessary for schedule requirements," as Mr. Chappell states. If there are any such they ought to be able to resell at a profit.

C. A. TUPPER.

Chicago, Ill., Jan. 16, 1916.

Dumping of German Machinery

To the Editor: We have read in different newspapers that America has to guard against the dumping of German goods after the war. As representatives of large German interests, we can assure you that this fear is entirely uncalled for. All our manufacturers have advised us of advances in prices up to 15 per cent, and have stated also that on account of large inland business deliveries will not be so short as they used to be before the war.

WIENER MACHINERY COMPANY,
Felix F. Wiener, President.

New York, Jan. 7, 1916.

Commerce of 1915 Through Soo Canals

The following statistics of Lake commerce through the canals at Sault Ste. Marie, Mich., and Ontario for the season of 1915, and corresponding figures for 1914, have been issued by L. C. Sabin, general superintendent of the St. Mary's Falls Canal:

Vessels:	No.	Season 1914	Season 1915	Per Cent	
				Inc.	Dec.
Steamers	14,994	17,699	18	..	..
Sailing	1,682	1,884	12	..	..
Unregistered	2,041	1,650	..	19	..
Total	18,717	21,233	13	..	..
Lockages:					
No.	13,502	13,808	2	..	..
Tonnage:					
Registered	net 41,986,339	56,399,147	34	..	..
Freight	net tons 55,369,934	71,290,304	29	..	..
Passenger	No. 59,801	50,336	..	16	..
Coal:					
Hard	net tons 2,240,505	2,030,730	..	9	..
Soft	net tons 12,246,716	11,326,328	..	8	..
Flour	barrels 9,715,085	8,436,937	..	13	..
Wheat	bushels 150,284,095	255,481,558	70	..	..
Grain	bushels 68,338,072	64,786,870	..	5	..
Mtd. and pig iron	net tons 239,663	211,781	..	12	..
Salt	barrels 777,208	699,337	..	10	..
Copper	net tons 91,764	156,436	70	..	..
Iron ore	net tons 31,413,765	45,213,604	44	..	..
Lumber	M. ft. B.M. 452,148	456,451	..	1	..
Building stone	net tons 1,317,304	1,595,398	21	..	..
General mdse.	net tons				

The United States Canal was opened April 17 and was closed Dec. 20, 1915; season, 248 days. The Canadian Canal was opened April 18 and closed Dec. 16, 1915; season, 248 days.

French promoters have been studying for some time the possibility of shipping iron ore to the United States from the Nantes district of France, according to Consul Clarence Carrigan of Nantes. The exports thus far have come from the mines of Chateaubriant and Segre, and they amounted to 153,203 gross tons in 1914. The ore from the Chateaubriant district contains about 45 per cent iron with 40 per cent as a minimum, silica about 15 per cent with 20 per cent as a maximum, and phosphorus 0.5 to 1 per cent. Evidently the ore is of too low a grade to warrant shipment to the United States.

Iron and Steel Markets

WAGES AT HIGHEST LEVEL

Youngstown Plants Will Resume Soon

Advances in Steel Products—Foreign Demand Still a Large Factor

The strikes and riot at Youngstown iron and steel plants were a startling development of the opening week of the new year. In showing the explosive possibilities of the labor situation, these events have confirmed fears for some time expressed in the steel trade.

The Steel Corporation's announcement of a general wage advance, to take effect Feb. 1, amounting to more than 10 per cent for common labor, was followed by similar advances by independent companies, these for the most part being made effective Jan. 1. Merchant blast furnaces took like action, so that within a few days practically the entire industry stepped up to the highest level of wages it has ever paid.

The next great adjustment will be that in coal mining, which has never been of more importance to the iron trade than in this year of expected strain on every link in the chain of production and transportation.

Latest advices indicate the acceptance of the advances offered at Youngstown and the resumption of work by the end of the week at the nine blast furnaces and the steel works involved. The stopping of coke shipments to these plants caused a weakening in the price of spot coke to as low as \$2.50. Shipments of steel-making pig iron from merchant furnaces were also held up, causing a decline of 25c. in basic iron, or to \$17.75 at furnace, while Bessemer iron receded 50c. or to \$20.50 at furnace.

The Steel Corporation's December business as gauged by the reported increase of 616,000 tons was relatively larger than independent companies have been indicating. At 7,800,000 tons, unfilled orders are the largest since early 1913, and represent an increase of 4,000,000 tons in 1915.

Usually quiet in the first half of January, the domestic steel trade has shown this month that price advances have not reached their limit and that export demand will be a factor in establishing higher levels. At Pittsburgh contracts amounting to 140,000 tons of barb wire for war use are offered, but mills there cannot make the deliveries asked. In bars for shells, also, limitations on the buying by France and England will be those imposed by mill conditions here.

The effect of 3.50c. and 4c. war bar business is seen in the steady climbing of prices on domestic contract business, bars, plates and shapes for second and third quarters going to 1.85c., Pittsburgh, this week. Iron pipe has risen \$4 a ton, steel and

iron boiler tubes \$4 a ton, Eastern bar iron \$2, rivets \$2 and spikes \$3. At Pittsburgh bolts and nuts are 10 per cent higher. Instances are still cropping up in which high prices of heavy products have cut off consumption, but their influence is lost, as the delivery periods of many mills stretch on into the third quarter.

Bids on four vessels for the Texas Company, to be built at Bath, Me., show that the plate situation grows tighter, one Eastern mill asking 2.50c., Pittsburgh.

Some implement business has been offered Central Western bar mills, but the latter are not willing now to cover this trade with contracts. Prices are now \$8 to \$10 above the highest level at which such buying has been done in years, which quite precludes anything like the six months' extensions given on agricultural contracts last year at \$1 advance.

Rail bookings thus far for 1916 are put at 1,800,000 tons, including foreign orders. Italy is inquiring for 5000 or 6000 tons.

Pittsburgh has booked 50,000 tons of steel for the 5000 cars the Standard Steel Car Company is to build for France, in addition to the 2000 placed in Canada; and at Chicago 20,000 tons of car steel was a part of the week's business. New domestic car orders amounted to about 3000.

Export demand for tin plate is so large that from 10c. to 35c. a box has been paid by foreign buyers above the new \$3.75 basis for domestic contracts.

The ferromanganese market is at last reflecting the more stringent situation long predicted, British prices going to \$125. However, ore arrivals were the largest of the year in November, reaching 50,000 tons.

Pittsburgh

PITTSBURGH, PA., Jan. 11, 1916.

Local conditions in pig iron, scrap and coke have been seriously disturbed by the labor troubles in the Youngstown district. One or two railroads are said to have declared off the embargo on export shipments via New York, but this has been more than offset by an embargo declared on shipments of iron and steel products to New England by the Boston & Maine and the New York, New Haven & Hartford railroads. It is believed that the lighterage situation in New York will be pretty well cleared up within a week or so, although at the moment it is about as bad as at any time since the embargo on export shipments was placed. The local steel market continues strong in every way, and the pressure on the mills by customers for deliveries is as insistent as ever. No further serious labor troubles are expected, and it is believed that the idle furnaces and mills at Youngstown will shortly be in full operation again.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Jan. 12,	Jan. 5,	Dec. 15,	Jan. 13,
Pig Iron, Per Gross Ton:	1916.	1916.	1915.	1915.
No. 2 X, Philadelphia...	\$20.00	\$19.75	\$19.50	\$14.25
No. 2 Valley furnace...	18.50	18.50	18.00	13.00
No. 2, Southern, Cin'ti...	17.90	17.90	16.90	12.40
No. 2, Birmingham, Ala...	15.00	15.00	14.00	9.50
No. 2, furnace, Chicago*	18.50	18.50	18.00	13.00
Basic, del'd, eastern Pa...	19.50	19.50	18.00	13.50
Basic, Valley furnace...	17.75	18.00	17.50	12.50
Bessemer, Pittsburgh...	21.45	21.95	19.45	14.55
Malleable Bess., Ch'go*	19.00	19.00	18.00	13.00
Gray forge, Pittsburgh...	18.45	18.45	17.95	13.45
L. S. charcoal, Chicago...	19.25	19.25	19.25	15.75

Billets, etc., Per Gross Ton:

Bess. billets, Pittsburgh...	32.00	32.00	30.00	19.00
O-h. billets, Pittsburgh...	33.00	33.00	31.00	19.00
O-h. sheet bars, P'gh...	35.00	35.00	31.00	20.00
Forging billets, base, P'gh...	55.00	55.00	52.00	24.00
O-h. billets, Phila....	42.00	40.00	36.00	21.40
Wire rods, Pittsburgh...	42.00	40.00	40.00	25.00

Finished Iron and Steel

Per Lb. to Large Buyers:	Jan. 12,	Jan. 5,	Dec. 15,	Jan. 13,
	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	2.250	2.159	1.959	1.17 1/2
Iron bars, Pittsburgh...	1.95	1.95	1.80	1.15
Iron bars, Chicago....	1.75	1.75	1.75	0.97 1/2
Steel bars, Pittsburgh...	2.00	2.00	1.80	1.10
Steel bars, New York...	2.169	2.169	1.969	1.26
Tank plates, Pittsburgh...	2.25	2.25	1.90	1.10
Tank plates, New York...	2.419	2.419	2.169	1.26
Beams, etc., Pittsburgh...	1.90	1.90	1.70	1.10
Beams, etc., New York...	2.069	2.069	1.869	1.26
Skelp, grooved steel, P'gh...	1.80	1.80	1.70	1.10
Skelp, sheared steel, P'gh...	1.90	1.90	1.80	1.15
Steel hoops, Pittsburgh...	2.00	2.00	1.90	1.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Jan. 12,	Jan. 5,	Dec. 15,	Jan. 13,
Sheets, Nails and Wire,	1916.	1916.	1915.	1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh...	2.60	2.60	2.50	1.80
Galv. sheets, No. 28, P'gh...	4.75	4.75	4.75	2.75
Wire nails, Pittsburgh...	2.10	2.10	2.00	1.55
Cut nails, Pittsburgh...	2.00	2.00	1.90	1.50
Fence wire, base, P'gh...	1.95	1.95	1.85	1.35
Barb wire, galv., P'gh...	2.95	2.95	2.85	1.95

Old Material, Per Gross Ton:

	Jan. 12,	Jan. 5,	Dec. 15,	Jan. 13,
Iron rails, Chicago...	17.50	17.50	16.00	11.25
Iron rails, Philadelphia...	19.50	19.50	19.00	13.00
Carwheels, Chicago...	14.75	14.75	14.50	10.00
Carwheels, Philadelphia...	16.50	16.00	15.50	11.00
Heavy steel scrap, P'gh...	17.50	17.50	17.50	11.75
Heavy steel scrap, Phila...	16.50	16.00	15.75	10.00
Heavy steel scrap, Ch'go...	15.50	16.00	15.75	9.00
No. 1 cast, Pittsburgh...	15.25	15.25	15.25	11.25
No. 1 cast, Philadelphia...	17.00	17.00	15.75	12.00
No. 1 cast, Ch'go (net ton)	13.50	13.75	13.75	9.25

Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt...	\$2.50	\$3.25	\$2.75	\$1.50
Furnace coke, future...	2.50	2.50	2.40	1.75
Foundry coke, prompt...	3.50	3.50	2.75	2.00
Foundry coke, future...	3.25	3.25	3.00	2.15

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	24.00	22.87 1/2	19.75	13.75
Electrolytic copper, N. Y...	23.87 1/2	22.87 1/2	19.50	13.62 1/2
Spelter, St. Louis...	17.25	17.25	16.50	5.90
Spelter, New York...	17.50	17.50	16.75	6.05
Lead, St. Louis...	5.75	5.40	5.25	3.50
Lead, New York...	5.90	5.50	5.40	3.70
Tin, New York...	41.50	45.00	37.65	33.35
Antimony, Asiatic, N. Y...	41.00	41.00	39.00	14.00
Tin plate, 100-lb. box, P'gh...	3.75	3.75	3.50	3.10

Pig Iron.—At present all the blast furnaces of the Republic Iron & Steel and Youngstown Sheet & Tube companies at Youngstown are banked, and all shipments of pig iron from outside furnaces to these two interests have been embargoed. This has released some Bessemer and basic iron sold to these two companies, but which cannot be delivered, to the open market, and prices of Bessemer and basic are off 25c. to 50c. per ton. A sale of 6000 tons of basic iron for first half was made at \$17.75; 2000 tons of No. 2 foundry for last half at \$18.50, and 1000 tons of Bessemer, same delivery, at \$20.50, all at Valley furnace. The molders' strike in the Pittsburgh district has curtailed local consumption of foundry iron, but prices are still fairly strong. We now quote standard Bessemer iron at \$20.50 to \$21; basic, \$17.75 to \$18; malleable Bessemer, \$17.50; gray forge, \$17.50, and No. 2 foundry, \$18.50 to \$19, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—The new demand for billets and sheet bars is quiet, but sheet and tin-plate mills are specifying heavily against contracts, and the steel mills are still far back in deliveries. The new demand for forging billets is not so insistent, but prices are still very firm. We quote Bessemer billets and sheet bars at \$32 to \$33 and open-hearth billets and sheet bars at \$33 to \$35, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$55 to \$56, for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 per ton extra.

Ferroalloys.—There has been an advance of \$15 per ton in the price of English 80 per cent ferromanganese, which puts it at \$125, seaboard, and with no guarantees as to deliveries. Prices of domestic are also higher, 80 per cent being held at \$130 to \$135, maker's furnace. We note sales of 300 to 400 tons of domestic 80 per cent ferromanganese at \$125 per gross ton at maker's furnace, but this price could not be duplicated to-day. Prices of Bessemer ferrosilicon for delivery in second quarter are as follows: 9 per cent, \$27; 10 per cent, \$28; 11 per cent, \$29; 12 per cent, \$30; 13 per cent, \$31.50; 14 per cent, \$33.50; 15 per cent, \$35.50, and 16 per cent, \$38. Seven per cent silvery for same delivery is \$24.50; 8 per cent, \$25; 9 per cent, \$25.50; 10 per cent, \$26; 11 per cent, \$27.50. All these prices are f.o.b. at furnace, Jackson, Ohio; New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh. We quote 50 per cent ferrosilicon for delivery through all of 1916 as follows: Up to 100 tons, \$85; over 100 tons and up to 600 tons, \$84, and over 600 tons, \$83; all per gross ton, delivered in the Pittsburgh district.

Plates.—The Carnegie and Jones & Laughlin steel companies have put the minimum price of plates at 1.85c., Pittsburgh, but this price is purely nominal and is quoted only for delivery at convenience of the seller, which would probably mean three to four months from date of order. The plates, shapes and bars, about 50,000 tons, for the 5000 freight cars to be built by the Standard Steel Car Company for France, have been placed with a local mill. The Standard Steel Car Company has taken 2000 ore cars for the Bessemer & Lake Erie Railroad, and 250 box cars for the Virginian. The Pressed Steel Car Company has taken 550 hopper and 200 gondola freight cars for the Lehigh & New England. The Pennsylvania Railroad is still holding out its contemplated order for 9000 cars on account of the high prices quoted by the steel car builders. The Union Pacific is in the market for 1500 box cars and 500 stock cars. Local plate mills are filled up for four or five months, and plates for shipment in three to four weeks still bring premiums. We quote 1/4-in. and heavier plates nominally at 1.85c., for shipment at convenience of the mill, while for delivery in three to four weeks 2.25c. and higher is being paid. One large plate mill is said to have sold plates for delivery in second quarter at 2.25c. at mill.

Structural Material.—New inquiry is active, and local fabricators are filled for four or five months. The John Eichleay, Jr., Company has taken 2200 tons of steel shapes for a central power-house at Washington, D. C.; the McClintic-Marshall Company, 800 tons for extensions to buildings of the Elmira Mfg. Company, Elmira, N. Y., and the American Bridge Company, 1300 tons for a new bridge for the Toledo, St. Louis & Western Railroad across the Wabash River at Silverwood, Ind. The minimum price on shapes is now 1.85c., Pittsburgh, for delivery at convenience of the mill, which would likely be two to three months from date of order. We quote beams and channels up to 15 in. at 1.85c. to 2c., Pittsburgh, prices depending on delivery wanted.

Steel Rails.—Fair-sized orders for standard sections and light rails are being entered by the Carnegie Steel Company, and its three rail mills at Bessemer are filled for six months. Sheet bars, steel rounds and rails are being rolled at the Edgar Thomson plant. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth steel, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows: 25 to 45 lb. sections, 1.55c.; 16 and 20 lb., 1.60c.; 12 and 14 lb., 1.65c.; 8 and 10 lb., 1.70c., in carloads, the usual advances being charged for less than carloads.

Sheets.—Shipments of hot sheet and tin-mill products by the American Sheet & Tin Plate Company in December, 1915, were the heaviest in any one month in its history. The new demand for blue annealed sheets and electrical sheets is enormously heavy. Blue annealed sheets of Nos. 12, 13 and 14 gages are largely used in the manufacture of oil barrels, and, as the oil industry all over the country is very active, the demand from barrel makers is greater than at any time for years. The American Sheet & Tin Plate Company is operating its sheet mills to 95 per cent of capacity, and has advanced its minimum price on blue annealed sheets, Nos. 9 and 10, to 2.40c., but is sold up for three to four months. For delivery through first quarter we quote Nos. 9 and 10 blue annealed sheets at 2.40c. to 2.50c.; No. 28 Bessemer black, 2.60c. to 2.70c.; No. 28 galvanized, 4.75c. to 5c. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., at 2.30c. to 2.40c.; Nos. 25, 26 and 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c., and No. 30, 2.50c. These prices are for carload and larger lots, f.o.b. maker's mill.

Tin Plate.—This trade is very active. The mills are running from 95 to 100 per cent of capacity, and have orders on their books to take their entire output for three or four months. For reasonably prompt delivery, \$4 per base box and higher is being quoted. The export demand is heavy. On some recent export orders prices were obtained ranging from 10c. to 35c. and even 40c. per box higher than the domestic price. We quote 14 x 20 coke plates at \$3.75 to \$3.90 per base box, and 200-lb. base, common ternes, 8-lb. coating, at \$6.90 to \$7 per box.

Railroad Spikes.—Prices on spikes have again been advanced \$3 per ton, the market being very strong. Makers report specifications from the railroads fairly active, but new demand quiet. Net prices now in effect are as follows:

Standard railroad spikes, 4 1/2 x 9/16 in. and larger, \$2.25; railroad spikes, 1/4 and 7/16 in., \$2.35 base; railroad spikes, 3/8 in. and 5/16 in., \$2.50 base, boat spikes, \$2.35 base, all per 100 lb., f.o.b. Pittsburgh.

Skelp.—Mills report demand active and state they have their output sold for three or four months. Prices are very strong. We quote: Grooved steel skelp, 1.80c. to 1.85c.; sheared steel skelp, 1.90c. to 1.95c.; grooved iron skelp, 2.20c. to 2.25c., and sheared iron skelp, 2.30c. to 2.35c., all delivered to consumers' mills in the Pittsburgh district.

Wire Rods.—A famine exists in the supply of rods, and \$42 to \$43 a ton has been offered for delivery in three to four weeks. Local makers have been out of the market for four or five months as sellers, and say they cannot make enough to supply their own needs and their regular customers.

Wire Products.—Two inquiries for barb wire for France and Great Britain are actively in the market, amounting to 140,000 tons, but none of the local mills will get any part of this, as they are filled for four or five months. Shipments of wire products into New England are embargoed, and this, with the embargo on export shipments, is allowing the mills to make better deliveries to domestic customers in other districts. Premiums of \$5 to \$10 per ton are still being offered for barb wire over regular prices for prompt delivery. It is said the output of wire and wire nails by domestic mills is practically sold up for the first half of 1916. Prices quoted to the large trade and for shipment at convenience of the mill, are as follows: Wire nails, \$2.10; galvanized nails 1 in. and longer taking an advance over this price of \$2, and shorter than 1 in., \$2.50; plain annealed wire, \$1.95; galvanized barb wire and

fence staples, \$2.95; painted barb wire, \$2.25; polished fence staples, \$2.25, all f.o.b. Pittsburgh, with freight added to point of delivery; terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 67 1/2 per cent off list for carload lots, 66 1/2 per cent for 1000-rod lots, and 65 1/2 per cent for small lots, f.o.b. Pittsburgh.

Hoops and Bands.—The minimum price on bands is now 1.85c., Pittsburgh, for shipment at convenience of the mill, which would mean in three or four months from date of the order. We quote steel bands at 1.85c. to 2c., with extras as per the steel bar card, and steel hoops, 2c. to 2.10c., f.o.b. Pittsburgh, prices depending on delivery wanted.

Cold-Rolled Strip Steel.—Local makers state that any prices they quote now are purely nominal, as they have their output sold for three to four months or longer. As high as \$4 base is being paid for material for reasonably prompt shipment on 1 1/2 in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb. Extras are as follows:

		0.10 to 0.19 Carbon—1 1/2 In. and Wider		Lengths 24 In. and Over	
Coils		Hard	Soft	Hard	Soft
Hard	Soft	\$0.25	100 and heavier	\$0.10	\$0.35
Base		0.30	0.050 to 0.099	0.20	0.45
0.20	0.45	0.35	0.035 to 0.049	0.35	0.60
0.35	0.75	0.31	0.031 to 0.034	0.60	1.00
0.45	0.85	0.25	0.025 to 0.030	0.85	1.25
0.55	0.95	0.20	0.020 to 0.024	1.05	1.45
1.35	1.35	0.17	0.017 to 0.019	2.45	2.45
1.75	1.75	0.15	0.015 to 0.016	2.85	2.85
2.45	2.45	0.13	0.013 to 0.014	3.70	3.70
2.80	2.80	0.12		4.30	4.30
3.15	3.15	0.11		4.65	4.65
3.50	3.50	0.10		5.00	5.00

Extras for soft apply for all intermediate tempers.

Shafting.—Nominal prices on cold-rolled shafting are 45 per cent off in carloads and 40 per cent in small lots, f.o.b. Pittsburgh, for shipment at convenience of the maker, which would be four or five months. Premiums are being paid for delivery in three to four weeks if the customer is able to find a mill that can make this delivery.

Iron and Steel Bars.—The minimum price of steel bars is now 1.85c., f.o.b. Pittsburgh, for shipment at convenience of the mill. One local maker has entered some large orders for steel bars for delivery in second quarter at this price, but states it may not be able to ship before third quarter. Deliveries in three to four weeks readily bring 2c. and higher. We quote steel bars at 1.85c., for delivery at convenience of the mill, 2c. to 2.25c. for shipment in three to four weeks, and 2.35c. to 2.50c. for delivery from warehouse. We quote refined iron bars at 1.95c. to 2c., and railroad test bars, 2.05c. to 2.10c., f.o.b. maker's mill.

Nuts and Bolts.—Some makers have advanced prices about 10 per cent, owing to the heavy demand and the higher prices for steel bars, and others will likely do so this week. Discounts in effect at this writing, and for prompt acceptance only, are as follows:

Carriage bolts, small, rolled thread, 70 & 12 1/2 per cent off; small, cut thread, 70 & 5; large, 65. Machine bolts with h. p. nuts, small, rolled thread, 70 & 10 & 7 1/2; small, cut thread, 70 & 12 1/2; large, 65 & 10. Machine bolts with c. p. c. & t. nuts, small, 70; large, 60 & 10. Bolt ends, with h. p. nuts, 65 & 10; with c. p. nuts, 60 & 10. Lag screws (cone or gimlet point), 75. Rough stud bolts, 60. Forged set screws and tap bolts, 40. Hot pressed square nuts, tapped or blank, \$4.50 off list; hexagon, \$4.70 off. C. p. c. & t. square nuts, tapped or blank, \$4.00 off; hexagon, \$5.25 off. C. p. plain square nuts, tapped or blank, \$4.00 off; hexagon, \$4.20 off. Semi-finished hexagon nuts, 80 per cent off. Finished and case-hardened nuts, 75 & 10. Rivets, 7/16 in. diameter and smaller, 70 & 10. These prices are delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.

Merchant Steel.—Mills are sold up for three or four months and are much back in deliveries. On small lots for shipment at convenience of the mills, we quote: Iron finished tire, 1/2 x 1 1/2 in. and larger, 2.05c., base; under 1/2 x 1 1/2 in., 2.20c.; planished tire, 2.25c.; channel tire, 3/4 to 7/8 and 1 in., 2.55c. to 2.65c.; 1 x 1 1/2 in. and larger, 2.95c.; toe calk, 2.65c. to 2.75c., base; flat sleigh shoe, 2.40c.; concave and convex, 2.45c.; cutter shoe, tapered or bent, 2.95c. to 3.05c.; spring steel, 2.65c. to 2.75c.; machinery steel, smooth finish, 2.45c.

Rivets.—Demand is still very heavy and prices have again been advanced \$2 per ton. We quote button-head

structural rivets, $\frac{1}{2}$ in. and larger, at \$2.60, and cone-head boiler rivets at \$2.70 per 100 lb., in carload lots, f.o.b. Pittsburgh, smaller lots bringing about 10c. advance.

Carwheels.—The Carnegie Steel Company will add another unit to its Schoen steel wheel works at McKees Rocks, increasing the capacity about 50 per cent. We quote 33-in. freight carwheels in lots of 1000 or more at \$18; 33-in. tender wheels, \$21; 36-in. passenger or tender wheels, \$25. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Wrought Pipe.—Following the advance of \$2 per ton on black and galvanized wrought-steel pipe, effective Jan. 4, makers of black and galvanized wrought-iron pipe lowered discounts two points, corresponding to an advance of \$4 per ton, also effective Jan. 4. The market on iron and steel pipe is very firm, mills reporting the new demand heavy. Oil country goods are active, and all lines of iron oil well supplies have been advanced \$2 to \$4 per ton. The new discounts on steel and iron black and galvanized pipe will be found on another page.

Boiler Tubes.—Effective Friday, Jan. 7, discounts on steel and iron boiler tubes were lowered two points, corresponding to an advance of \$4 per ton. Mills report the demand for locomotive tubes very heavy, and they are back in shipments four to six weeks or longer. The new demand for merchant tubes is also active. A good many former consumers of seamless steel tubing are now using locomotive tubes, being unable to get deliveries on seamless. The new discounts on iron and steel boiler tubes are given on another page.

Old Material.—The serious labor troubles in the Youngstown district have disturbed the local scrap market. Embargoes on scrap destined for three consumers in Youngstown have been declared, and while they last the scrap will have to be diverted to other sources of consumption. The demand is not very active, but prices are firm. Dealers believe the market will be higher in the near future, as the consumption of scrap is very heavy. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	17.50
Compressed side and end sheet scrap	16.00
No. 1 foundry cast	\$15.25 to 15.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	14.00 to 14.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.50 to 18.75
No. 1 railroad malleable stock	15.50
Railroad grate bars	10.75 to 11.00
Low phosphorus melting stock	21.50
Iron car axles	24.50 to 25.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	24.00 to 24.50
No. 1 busheling scrap	15.00
Machine shop turnings	10.00 to 10.25
Old carwheels	14.50
Cast-iron borings	10.75 to 11.00
Sheet bar crop ends	18.00 to 18.50
Old iron rails	16.00 to 16.50
No. 1 railroad wrought scrap	17.50
Heavy steel axle turnings	13.50 to 14.00
Heavy breakable cast scrap	13.50 to 14.00

*Shipping point.

Coke.—Embargoes on coke routed to the Republic Iron & Steel Company, Youngstown Sheet & Tube Company and the Struthers Furnace Company have been declared. All the blast furnaces of these three companies are banked, and it has thrown a good deal of prompt furnace coke on the market with the result that prices have declined. Prompt blast furnace coke is offered at \$2.50 per net ton. There is no inquiry for contract furnace coke, consumers being covered. We now quote best grades of blast furnace coke for spot shipment at \$2.75 to \$3, and on contracts for first half of the year, \$2.50 to \$2.75 is quoted. We quote best grades of 72-hr. foundry coke for prompt shipment at \$3.50 to \$3.75, and on contracts from \$3.25 to \$3.50 per net ton at oven. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended Jan. 1 as 379,778 net tons, a decrease over the previous week of nearly 40,000 tons, due largely to several Greek holidays observed there.

Chicago

CHICAGO, ILL., Jan. 12, 1916.—(By Wire.)

Warning taken from the experiences gained with respect to mill conditions for the first half of the year may well be carefully observed by steel users in considering their last half needs. It should be appreciated that some of the mills are booked up to September. The placing of tonnages for specific business is going on steadily, but the fact that none of the mills is canvassing the trade for orders gives little prominence to the rapid absorption of their capacity. Last week's sales of steel for second half rolling, with practically no solicitation of the business, totaled a normal week's tonnage. Specifications against existing contracts were easily double that amount. Orders for over 20,000 tons of car steel were booked, and some 10,000 tons of rails and 11,500 kegs of spikes and bolts were placed. The recent rush of orders for plates has subsided somewhat, but not until prices had risen to 2.50c., Pittsburgh, for prompt shipment, with one mill asking 3c. Structural steel for prompt shipment is not commanding such marked premiums, a sale of 1000 tons of angles having been made at 2.10c., Pittsburgh. Blue-annealed sheets have been advanced disproportionately. Pig-iron inquiry continues active, several lots of 1000 tons being noted, together with sales in similar quantity. The first half requirements of the St. Louis basic user are reported to have been covered. The scrap market is experiencing a slight recession of prices, the softening of the market being largely attributable to congestion of cars at consumers' works.

Pig Iron.—Sales of Northern pig iron last week, of which there were a number in lots of 500 and 1000 tons, clearly indicated the firmness of the market on the basis of \$18.50 for No. 2 foundry and \$19 for malleable Bessemer, f.o.b. furnace. Reports regarding sales of Southern iron, indicating some irregularity in quotations, would seem to be of no great significance in view of the purchases of good sized lots by close buyers at full prices. Transactions on the basis of \$15.50 for first half delivery for No. 2 at Birmingham furnace and \$16 for second half are noted. Among such purchases are lots of 500, 600 and 1100 tons. For second half, one interest will sell at \$16.50. Resale Southern iron is being offered in this market as well as a continuous quantity of spot shipment iron, and it seems probable that in either of these connections may be found the basis of rumored concessions. A sale of 1000 tons of low phosphorus iron on the basis of \$33.50, Chicago, is noted. Reports of the week indicate an increasing desire on the part of melters for early shipment of iron due and also a steady decrease in stocks on furnace yards. Labor and car shortage appear to be making themselves felt in a delay of some shipments. The Iroquois Iron Company is preparing a third blast furnace for the resumption of active operations at an early date. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$19.25 to \$19.75
Lake Superior charcoal, No. 1	19.75 to 20.75
Lake Superior charcoal, No. 6 and Scotch	20.25 to 21.25
Northern coke foundry, No. 1	19.00
Northern coke foundry, No. 2	18.50
Northern coke foundry, No. 3	18.00
Southern coke, No. 1 f'dry and 1 soft.	19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft.	19.00 to 19.50
Malleable Bessemer	19.00
Basic	18.00
Low phosphorus	32.00 to 36.00
Silvery, 8 per cent	26.50
Silvery, 10 per cent	27.50

(By Mail)

Rails and Track Supplies.—Railroad business of last week included the placing of about 10,000 tons of rails, among which were 4000 tons for the Cincinnati, Hamilton & Dayton, and 4000 tons for the Des Moines & Fort Dodge. Purchases of fastenings are noted in the aggregate of 11,500 kegs of spikes and bolts, including one lot of 7000 kegs, another of 3000 kegs of spikes and 1500 kegs of bolts. For these transactions, minimum

prices of 2.10c. for spikes and 2.50c. for bolts ruled. We quote standard railroad spikes at 2.10c., base; track bolts with square nuts, 2.50c., base, all in carload lots, Chicago; tie plates, \$36, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.43c.; 16 to 20 lb., 1.48c.; 12 lb., 1.53c.; 8 lb., 1.58c.; angle bars, 1.50c., Chicago.

Structural Material.—Car orders placed last week included 1500 for the Missouri, Kansas & Texas, awarded to the American Car & Foundry Company, and 1000 for the Denver & Rio Grande, placed with the Pullman Company. The steel for these cars has been taken by local mills for as early rolling as is possible in the second half. Contracts for the fabrication of structural material closed in the week totaled over 7000 tons, among which the principal lettings were 2100 tons of bridge material for the Burlington, divided 1200 tons to the Chicago Bridge & Iron Company, 600 tons to the Milwaukee Bridge Company and the remainder to the Wisconsin Bridge Company, King Bridge Company and Morava Construction Company, and 1600 tons for the Cook County Hospital, placed with the South Halsted Street Iron Works. The American Bridge Company will furnish 475 tons for the addition to the Union League Club, Chicago, 470 tons for a Duluth, Missabe & Northern Railroad viaduct and 250 tons of mine timbering for the Oliver Iron Mining Company. A. Bolters' Sons took a small contract for the city. The Crane Company, Chicago, is planning the erection of another unit at its Corwith plant, for which 400 tons of shapes will be required. The fact that the building is designed in Bethlehem shapes, also that deliveries from that mill can still be made with reasonable promptness, indicates the direction in which the steel may be placed. From other mills, delivery of structural material is practically restricted to second half, on new business, except for the small tonnage taken at a premium for prompt delivery. Typical of such business was the placing last week of an order for 1000 tons of large angles at a price equivalent to 2.10c., Pittsburgh. Business taken at Chicago last week for regular rolling was booked at 1.85c., Pittsburgh, and on that basis we quote for Chicago delivery of structural steel from mill 2.039c. to 2.289c.

The price of structural steel out of store has been advanced \$2 per ton, and we quote for Chicago delivery out of stock 2.50c.

Plates.—The activity of Western plate-users in the past few weeks, which resulted in the placing of a considerable quantity in lots of 500 to 1000 tons, has tapered off noticeably. The only current inquiry of prominence is one for 500 tons for a tank builder at Decatur, Ill. Numerous sales of plates in lots of 100 tons and larger, on the basis of 2.50c., Pittsburgh, are noted, although a more common price has been 2.25c., where prompt shipment is desired. On the other hand, one mill is now asking 3c., Pittsburgh. We quote for Chicago delivery of plates from mill 2.039c. to 2.689c.

In keeping with the advance of \$2 per ton we have revised our quotation and quote for Chicago delivery of plates out of stock 2.50c.

Sheets.—The demand for blue-annealed sheets has carried the price up to a point quite out of line with the usual differentials, and 2.50c., Pittsburgh, is the common quotation. For black sheets, quotations vary from 2.65c. to 2.75c., Pittsburgh, for No. 28. New foreign inquiry for blue-annealed and black sheets runs into several thousand tons. We quote for Chicago delivery from mill, No. 10 blue annealed, 2.689c.; No. 28 black, 2.839c. to 2.889c.; No. 28 galvanized, 4.689c. to 5c.

We quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.70c.; No. 28 black, 2.90c.; No. 20 and heavier galvanized, 4.80c.; No. 22 and lighter, 5c.

Bars.—Bar-iron tonnage is becoming slightly more plentiful, although the expectation of a general turning to iron by those users of bars who are unable to secure steel has not yet made itself felt to any marked extent. Bar-iron prices are somewhat firmer but the material can still be had on the basis of 1.75c. Steel bars also may be had for fairly prompt delivery, rolled from billets, and for such bars prices as high as 2.50c., Chicago, have been paid. We quote mill shipments, Chicago, as follows: Bar iron, 1.75c. to 1.80c.; soft steel

bars, 2.039c. to 2.289c.; hard steel bars, 1.80c. to 2c.; shafting, in carloads, 45 per cent off; less than carloads, 40 per cent off.

The price of bars out of store has been advanced \$2 per ton and shafting discounts have been decreased 5 per cent. We have revised our quotations accordingly. We quote store prices for Chicago delivery: Soft steel bars, 2.40c.; bar iron, 2.40c.; reinforcing bars, 2.40c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 30 per cent off.

Rivets and Bolts.—The situation in these products, which has largely been established in its present strength by the scarcity of raw materials, offers an interesting contrast between rivets and bolts. For the former the demand is quite moderate, the price being apparently independent of that factor, while for bolts the works are, with perhaps one exception in this territory, sold up to capacity and specifications are very heavy. The following discounts represent the recent advance, and we quote as follows: Carriage bolts up to $\frac{3}{8}$ x 6 in., rolled thread, 70-12 $\frac{1}{2}$; cut thread, 70-5; larger sizes, 65; machine bolts up to $\frac{3}{8}$ x 4 in., rolled thread, with hot pressed square nuts, 70-10-7 $\frac{1}{2}$; cut thread, 70-12 $\frac{1}{2}$; larger sizes, 65-10; gimlet point coach screws, 75; hot pressed nuts, square, \$4.70 off per 100 lb.; hexagon, \$4.50 off. Structural rivets, $\frac{3}{8}$ to 1 $\frac{1}{4}$ in., 2.60c. to 2.65c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote revised prices, out of store: Structural rivets, 2.75c.; boiler rivets, 2.85c.; machine bolts up to $\frac{3}{8}$ x 4 in., 70-12 $\frac{1}{2}$; larger sizes, 65-10; carriage bolts up to $\frac{3}{8}$ x 6 in., 70-5; larger sizes, 65 off; hot pressed nuts, square, \$4.50, and hexagon, \$4.70 off per 100 lb.; lag screws, 75.

Cast-Iron Pipe.—Lettings of pipe include 500 tons Jan. 12 at Elyria, Ohio, and 600 tons at Emporia, Kan. An award was made at Madison, Wis., of 600 tons to the American Cast Iron Pipe Company. We quote as follows per net ton, Chicago: Water pipe, 4 in., \$30.50; 6 in. and larger, \$28.50, with \$1 extra for class A water pipe and gas pipe.

Old Material.—A softening in prices of scrap is a feature of this market, most pronounced with respect to steel scrap, as a result of the embargo at the works of the Inland Steel Company. The weakness in the market can hardly be of shorter duration than this embargo, and the congestion is such as to offer little promise of relief within a fortnight. In the meantime, carload lots of steel, under necessity of being moved, are being sold at prices as low as \$15. The weakness extends, in less degree, to other grades of scrap, including No. 1 busheling, turnings, and pipes and flues. Railroad offerings of scrap last week totaled about 6000 tons, of which the larger lists were 1700 tons from the Great Northern, 2150 tons from the Wabash and 1700 tons from the Michigan Central. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$16.00 to \$16.50
Relaying rails	19.50 to 20.50
Old carwheels	14.75
Old steel rails, rerolling	17.00 to 17.50
Old steel rails, less than 3 ft.	16.50 to 16.75
Heavy melting steel scrap	15.50 to 16.00
Frogs, switches and guards, cut apart	15.50 to 16.00
Shoveling steel	15.00 to 15.50
Steel axle turnings	11.75 to 12.25

Per Net Ton	
Iron angles and splice bars	\$17.00 to \$17.25
Iron arch bars and transoms	18.00 to 18.50
Steel angle bars	14.00 to 14.50
Iron car axles	19.50 to 20.00
Steel car axles	21.50 to 22.00
No. 1 railroad wrought	16.00 to 16.25
No. 2 railroad wrought	14.25 to 14.75
Cut forge	14.25 to 14.75
No. 1 busheling	13.25 to 13.50
No. 2 busheling	9.25 to 9.50
Pipes and flues	11.75 to 12.25
Steel knuckles and couplers	14.75 to 15.25
Steel springs	15.75 to 16.25
No. 1 boilers, cut to sheets and rings	11.00 to 11.50
Boiler punchings	13.75 to 14.25
Locomotive tires, smooth	15.75 to 16.25
Machine shop turnings	8.50 to 8.75
Cast borings	7.75 to 8.00
No. 1 cast scrap	13.50 to 14.00
Stove plate and light cast scrap	11.00 to 11.50
Grate bars	11.00 to 11.50
Brake shoes	10.25 to 10.75
Railroad malleable	14.00 to 14.25
Agricultural malleable	11.50 to 12.00

Wire Products.—Among the large tonnages of various materials, which the agents of Great Britain and France are offering for quotations, is 100,000 tons of barb wire for a part of which Western mills are ne-

goliating. With this as an indicator, the promise is for the same restriction of supply in the second half as will prevail in the first six months. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, \$2.139; wire nails, \$2.289; painted barb wire, \$2.439; galvanized barb wire, \$3.139; polished staples, \$2.439; galvanized staples, \$3.139, all Chicago.

Philadelphia

PHILADELPHIA, PA., Jan. 11, 1916.

In all steel products except structural material the pressure of demand shows no diminution. Consumers of shapes hesitate to specify, in view of the high prices they must pay, as compared with those left behind with 1915. The demand for plates keeps up in an amazing way, and the mills are taxed to take care of their regular customers. Steel bars are difficult to secure, and iron bars have been advanced. Inquiry for forward deliveries of billets and forging blooms continues to come out strong, only to reveal that most of the makers are out of the market. The call for steel rounds of sizes suitable for shell manufacture is heavy, most of the inquiry being for last half delivery. Foundry iron is quiet but strong, and no difficulty is found in getting asking prices for small lots and prompt deliveries. The railroad freight situation, particularly with regard to deliveries in New England, is serious. It is practically impossible to get material into the greater part of Connecticut. The holding up of coke shipments to eastern Pennsylvania furnaces is a bad phase of the same situation. Although all the Eastern mills have advanced or are likely to advance the wages of common labor, employers are feeling some uneasiness over the attitude of their workmen. So far no trouble has developed except for desertions to enter the employ of munitions makers. The quotation for future deliveries of English ferromanganese has been advanced to \$125. Prompt furnace coke is strong at \$4 to \$4.25.

Pig Iron.—Purchases of small lots of foundry iron at full prices have been fairly numerous, but as a general thing demand from the foundries has been quiet, which usually is the case at this season. Steel-making iron has been quiet, also, only one or two comparatively small sales of basic being reported, while activity in low-phosphorus is restricted by the sold-up condition of the makers. A Perth Amboy, N. J., steel maker has closed for about 4000 tons of basic. For 500 tons containing 1 per cent phosphorus, \$19.50, delivered, was paid, while for the remainder, which ran 0.3 per cent phosphorus, the price was \$20. The trade is now looking for the beginning of activity for second-half requirements. The railroad situation is bad, particularly with regard to New England, delivery in several districts there having been blocked by the embargoes of the various railroads. It will not be surprising if some of the New England foundries have to shut down or at least go on part time if the situation is not soon relieved. In eastern Pennsylvania the question of furnace coke deliveries is a serious one. Already one furnace has been banked once or twice because of a shortage of coke. Quotations at furnace for eastern Pennsylvania No. 2 X generally range from \$19.50 to \$20, while for Virginia No. 2 X, the price is unchanged at \$17.25 furnace, for first quarter and first half, \$17.50 for the second quarter alone, and \$18 for the third quarter or last half. Buffalo iron is quoted at \$18, furnace, taking a freight rate of \$2.58 to Philadelphia. While the full price is obtained for small lots, it is generally understood that contracts for round lots have been booked at concessions. Quotations for standard brands, delivered in buyers' yards, prompt shipment range about as follows:

Eastern Pa., No. 2 X foundry	\$20.00 to \$20.50
Eastern Pa., No. 2 plain	19.75 to 20.25
Virginia, No. 2 X foundry	20.00 to 20.50
Virginia, No. 2 plain	19.50 to 20.00
Gray forge	18.25 to 19.75
Basic	19.50 to 20.00
Standard low phosphorus	32.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended Jan. 8 consisted of 6200 tons from French Africa and 6000 tons from Spain.

Ferroalloys.—In accordance with advices from abroad the representatives of English makers of 80 per cent ferromanganese have advanced their quotation for future shipment to \$125, seaboard. For one or two carloads of spot material \$150, seaboard, has been paid. Quotations for 50 per cent ferrosilicon are unobtainable, but the price named for 11 per cent material is \$33.44, Philadelphia.

Bars.—The nominal quotations for steel bars are 1.95c. and 2.009c., Philadelphia, but these prices do not insure prompt deliveries. Makers continue out of the market, and premiums are common. A regular customer of one mill cheerfully paid 2.159c., Philadelphia, when a point was strained to satisfy his needs, and this is not an exceptional case. Iron bars are higher at 2.259c., Philadelphia, carload lots, four weeks' delivery, while less than carloads commands premiums. There is good inquiry for steel shell rounds. The foreign inquiry is chiefly for last half. The Bethlehem Steel Company wants 5000 tons for first quarter.

Plates.—A large mill in the East cannot undertake deliveries on new business this side of June. It is selling to its old customers only, and to these it quotes 2.659c., Philadelphia. It finds the pressure of demand as great as ever, and is turning down business from shipyards and others. In a few cases boilermakers say they must shut down unless they can get plates, and there is little prospect of their hopes being realized. Another maker is quoting 2.509c. to 2.559c., Philadelphia. A mill is finishing up a belated export order at 1.23c., New York, or just about half what is prevailing to-day.

Structural Material.—The market is quiet, and the week has brought little or no change. The minimum quotation is 2.159c., Philadelphia, while on some business 2.25c., Pittsburgh or eastern mill is quoted, depending on the location of the buyer. For deliveries this quarter consumers must pay from \$8 to \$12 per ton, and sometimes more, over what they did in the last quarter of 1915, and they are slow in specifying at the higher level. In some cases they are helped out by deliveries on deferred shipments.

Billets.—Forging billets have brought \$55 to \$60, and open-hearth rerolling billets are quoted at \$42 to \$45, but the deliveries are indefinite. Inquiry is heavy for both export and domestic use.

Rails.—Southern railroads which have lately been in the market are expected to place additional lots of 3000 and 5000 tons at an early date.

Sheets.—No. 10 blue annealed are strong at 2.759c. to 2.905c., Philadelphia. Orders continue to accumulate.

Coke.—Prompt foundry coke is strong and active at \$4 to \$4.25 per net ton at oven. Spot furnace is quoted at \$3 to \$3.50 per net ton at oven. Difficulty in getting shipments through is a factor with both grades. Contract foundry ranges from \$3.25 to \$3.50, and contract furnace, first half, at \$2.35 to \$2.50. Freight rates from the principal producing districts follow: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—The demand for heavy melting steel is a little improved, and small lots have been taken by two mills at \$16.50. More than this figure has been offered for large tonnages. The market is described as in a strong and healthy condition, but the movement of material, so far, is not heavy. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel	\$16.50 to \$17.00
Old steel rails, rerolling	19.00 to 20.00
Low phosphorus heavy melting steel scrap	21.50 to 22.50
Old steel axles	25.00 to 26.00
Old iron axles	27.00 to 28.00
Old iron rails	19.50 to 20.00
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	22.00 to 23.00
Wrought-iron pipe	16.00 to 16.50
No. 1 forge fire	12.50 to 14.00
Bundled sheets	13.50 to 14.00
No. 2 busheling	11.00 to 11.50
Machine shop turnings	11.50 to 12.00
Cast borings	11.50 to 12.00
No. 1 cast	17.00 to 18.00
Grate bars, railroad	12.50 to 13.00
Stove plate	12.00 to 12.50
Railroad malleable	15.00 to 15.50

Cleveland

CLEVELAND, OHIO, Jan. 11, 1916.

Iron Ore.—Little activity has developed in the market since the holidays. Consumers who have not already covered for their requirements seem in no hurry to place orders. Shipments from the docks to furnaces are very heavy. Lake Erie docks shipped in December 1,165,840 gross tons of ore, as compared with 355,076 tons in December, 1914. There was on the docks Jan. 1 7,951,534 tons as compared with 8,051,910 tons a year ago. Shipments to furnaces during 1915 were 28,188,641 tons as compared with 18,005,185 tons in 1914. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; Old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—Foundry iron prices for the last half have been established by Cleveland and Valley furnaces at \$19 for No. 2, and a number of sales in lots of 1500 tons and under have been made on that basis. Foundry and malleable iron is quoted at \$18.75 in Toledo for the last half and considerable business has been taken at that price for prompt shipment from that point. In Erie a last half price of \$19.50 is being quoted. Some malleable iron has brought \$19.25 for Eastern shipment for last half. While most sellers have opened their books for the last half at the prices prevailing for early delivery, few if any are making efforts to take orders but are making contracts with consumers who want to buy. Steel-making iron is quiet. Shipments are usually heavier than production so that furnace stocks continue to be reduced. Some Southern iron sales in small lots are being made at \$15.50, Birmingham, for No. 2 for last half, although some producers are asking \$16. For first half delivery Southern iron is firm at \$15. We quote, delivered Cleveland, as follows:

Bessemer	\$21.95
Basic	19.30
Northern No. 2 foundry	19.30
Southern No. 2 foundry	\$19.00 to 19.50
Gray forge	18.30
Jackson Co. silvery 8 per cent silicon	26.62
Standard low phos., Valley furnace	31.00

Coke.—The demand for foundry coke for spot shipment which has been fairly active has quieted down and prices are somewhat softer although sales are reported at \$4 per net ton at oven for best makes. We quote standard Connellsville foundry coke at \$3.50 to \$4 for prompt shipment and \$3.25 to \$3.75 for contracts. In spot some business has been taken at \$3.10, but in the past week lower prices have been quoted in view of the holding up of shipments to Youngstown furnaces.

Finished Iron and Steel.—Some of the implement makers in this territory have already come into the market with inquiries for steel bars, three months or more earlier than usual, but it will probably be some time before the mills will be willing to cover this trade with contracts. The implement manufacturers have contracts for the first half at 1.25c., Pittsburgh. Last year the mills for some time held this trade down to six months contracts, but later followed the action of one western mill in extending these contracts through the first half at an advance of \$1 a ton over the last half price. While there is considerable inquiry most mills are sold up for the first half and are unwilling to take orders for the last half. The demand for plates is heavy and the local market is firm at 2.50c. to 3c., Pittsburgh, for early delivery. One Eastern mill is offering sheared plates at 2.25c. to 2.50c., Pittsburgh, for early shipment. For delivery at the convenience of the mills steel bars and plates and structural material are quoted at 1.85c. to 1.90c., Pittsburgh. Some structural work is being held back because of high prices. The Clover Leaf has placed 1260 tons with the American Bridge Company and 1200 tons with the Toledo Bridge & Crane Company for bridge work. The Cleveland Railway Company has an inquiry out for 4000 tons of standard section rails. Sheets are in good demand with prices firm at 2.60c., Ohio mill, for No. 28 black, 2.40c. to 2.60c. for No. 10 blue annealed and 4.75c. to 5c. for No. 28 galvanized. The demand for tin plates is heavy with price firm at \$3.75. Hard steel bars are quoted at 1.80c., Pittsburgh and iron bars at 2c. An advance of \$2 or more per ton is expected to-morrow on warehouse prices,

following an advance made on these prices at other centers in the Central West. Subject to this expected advance warehouse quotations are unchanged at 2.50c. for steel bars, plates and structural material.

Bolts, Nuts and Rivets.—Effective Jan. 11 the price of rivets was advanced \$2 a ton to 2.60c., Pittsburgh, for structural rivets and 2.70c. for boiler rivets for car lots. The demand continues heavy. Although Pittsburgh bolt and nut makers are reported to have advanced the prices last week local bolt and nut prices are unchanged but Cleveland makers expect to advance prices within a day or two. The demand is heavy and some makers are having great difficulty in getting steel. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{1}{4}$ in. by 6 in., smaller or shorter, rolled thread, 70 and $12\frac{1}{2}$, cut thread, 70 and 5, larger or longer, 65; machine bolts with h. p. nuts, $\frac{1}{4}$ x 4 in., smaller or shorter, rolled thread, 70, 10 and $7\frac{1}{2}$, cut thread, 70 and $12\frac{1}{2}$, larger and longer, 65 and 10; lag bolts, gimlet or cone point, 75, square h. p. nuts, blank or tapped, \$4.50 off list; hexagon h. p. nuts, blank or tapped, \$4.70 off, c. p. c. and t. square nuts, blank or tapped, \$4 off; hexagon nuts, all sizes, \$5.25 off; cold pressed semi-finished hexagon nuts, all sizes, 80 off.

Old Material.—The market is dull and slightly weaker. The mills are crowded with scrap that was shipped at the end of the year and are out of the market. Dealers, however, look for a stiffening in prices as soon as buying is resumed. The mills continue to pay high prices for railroad scrap. The New York Central road sold its heavy melting steel scrap last week at \$18 a ton or higher. Ordinary heavy melting steel scrap is about 50c. a ton lower in this market and turnings and busheling have declined 25c. to 50c. Busheling is probably the weakest item on the list owing to the fact that one of the Cleveland rolling mills has declared an embargo on this grade and another is not accepting shipments. We quote f.o.b. Cleveland as follows:

	Per Gross Ton
Old steel rails	\$15.75 to \$16.00
Old iron rails	19.00
Steel car axles	23.00 to 24.00
Heavy melting steel	16.00 to 16.50
Old carwheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.00 to 14.25
Railroad malleable	16.75 to 17.25
Steel axle, turnings	13.50 to 14.00
Light bundled sheet scrap	12.75 to 13.25

	Per Net Ton
Iron car axles	\$23.00 to \$24.00
Cast borings	8.00 to 8.25
Iron and steel turnings and drillings	7.25 to 7.75
No. 1 busheling	14.00 to 14.50
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.50 to 11.00
Stove plate	9.50 to 10.00

St. Louis

ST. LOUIS, MO., Jan. 10, 1916.

Pig Iron.—Quotations here are very firmly held at \$15 to \$15.50 for No. 2 Southern foundry, Birmingham, for first half, with practically no disposition to take any business for the first quarter, all furnaces being sold up and only inclined to consider second quarter business as submitted by representatives.

Coke.—There is increasing activity in coke with a sharper demand for allotments. The local by-product coke is quotable on the Connellsville basis, but continues to control the market when there is any real competition.

Finished Iron and Steel.—The best delivery being promised now is eight months hence, and there is no disposition to accept premiums for quicker shipment. Books are not open for last half delivery on a contract basis. Movement out of stock from the warehouses is very active, and the pressure for deliveries is making it difficult for the warehouses to meet demand because of the conditions at the mills. We quote for stock out of warehouse as follows: Soft steel bars, 2.45c.; iron bars, 2.40c.; structural material, 2.55c.; tank plate, 2.55c.; No. 10 blue annealed sheets, 2.75c.; No. 28 black sheets, cold rolled, one pass, 3.20c.; No. 28 galvanized sheets, black sheet gage, 5.25c.

Old Material.—The past two weeks have been marked by a clearing of the decks for the new year. Dealers and consumers expect higher prices by the first of February. Rolling mills, foundries, etc., are ap-

parently ready to take freely, now that they have completed their review of stock conditions. The lists out include these: Cotton Belt, 300 tons; Great Northern, 1600 tons; Big Four, 6000 tons; Chicago & Alton, 600 tons; Southern Railway, 6000 tons; Wabash, 2300 tons; Missouri, Kansas & Texas, 2300 tons; Kansas City Terminal, 200 tons and a local industry 200 tons. Relaying rails continue hard to get. We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$15.50 to \$16.00
Old steel rails, rerolling	17.00 to 17.50
Old steel rails, less than 3 ft.	16.50 to 17.00
Relaying rails, standard section, sub- ject to inspection	21.00 to 23.00
Old carwheels	13.50 to 14.00
No. 1 railroad heavy melting steel scrap	15.50 to 16.00
Heavy shoveling steel	13.50 to 14.00
Frogs, switches and guards, cut apart	15.50 to 16.00
Bundled sheet scrap	10.00 to 10.50

Per Net Ton	
Iron angle bars	\$15.00 to \$15.50
Steel angle bars	14.00 to 14.50
Iron car axles	20.00 to 20.50
Steel car axles	21.00 to 21.50
Wrought arch bars and transoms	17.00 to 17.50
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	14.00 to 14.50
Railroad springs	14.50 to 15.00
Steel couplers and knuckles	15.00 to 15.50
Locomotive tires, 42 in. and over, smooth inside	14.50 to 15.00
No. 1 dealers' forge	12.00 to 12.50
Mixed borings	8.50 to 9.00
No. 1 busheling	12.50 to 13.00
No. 1 boilers, cut to sheets and rings	10.00 to 10.50
No. 1 railroad cast scrap	13.00 to 13.50
Stove plate and light cast scrap	10.00 to 10.50
Railroad malleable	12.00 to 12.50
Agricultural malleable	10.50 to 11.00
Pipes and flues	10.00 to 10.50
Railroad sheet and tank scrap	10.00 to 10.50
Railroad grate bars	9.50 to 10.00
Machine shop turnings	10.00 to 10.50

Cincinnati

CINCINNATI, OHIO, Jan. 12, 1916.—(By Wire.)

Pig Iron.—The market appears to be dragging somewhat, only a few general inquiries being out. One of these is from northern Ohio for 1000 tons of mixed Northern and Southern iron for last half shipment and an Indiana melter wants the same tonnage for February-April delivery. Only a few small sales have been made in this immediate vicinity, but a Michigan consumer bought for second and third quarter shipment 1500 tons of Northern foundry iron and 500 tons of Southern. About 700 tons of Northern No. 2 foundry was purchased by a northern Ohio concern for last half shipment. The majority of Southern sales for last half shipment has been made on a basis of \$15, Birmingham, but at least one furnace interest is yet willing to take on business at \$14.50. There is no uniformity in quotations for last half iron, all the way from \$15 to \$16, Birmingham, being quoted. Northern foundry is unchanged at \$18, Ironton, but strictly last half contracts have been made at this figure. The Ohio silvery irons are quoted around \$26 at furnace for nearby shipment and at \$25 for second and third quarter movement. As far as known, no Virginia iron was sold in this territory last week. Basic and malleable are both scarce for nearby shipment. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$18.40 to \$18.90
Southern coke, No. 2 f'dry and 2 soft.	17.90 to 18.40
Southern coke, No. 3 foundry	17.40 to 17.90
Southern No. 4 foundry	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon	26.28 to 26.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.26 to 19.76
Basic, Northern	19.26 to 19.76
Lake Superior charcoal	20.70 to 21.70
Standard Southern carwheel	24.40 to 24.90

(By Mail)

Coke.—Prompt shipment prices are very erratic, due mainly to a shortage of labor in producing districts, more especially in the Connellsville region. Quotations on spot furnace coke range from \$2.65 to \$3 per net ton at oven in all districts. Contract figures are from \$2.25 to \$2.50. Foundry coke is moving on old contracts at a satisfactory rate, but new business is mostly confined to small lots to fill in. For prompt shipment 72-hr. coke is

quoted at \$3.25 to \$4, but future shipment contracts can be made as low as \$3, although the majority of producers ask \$3.25 to \$3.60.

Finished Material.—A fair demand is observed for galvanized sheets, but the mills in this territory are only taking on business for nearby shipment. Jobbers' quotations on No. 28 galvanized sheets are below mill prices, and it is possible to buy them at 4.75c. to 5c., although the tonnage in stock is somewhat limited. The mills are quoting 5.15c., Cincinnati, or Newport, Ky. The mill price of No. 28 black sheets is unchanged at 2.65c. Steel bars are quoted from warehouse stocks at 2.45c. and small structural shapes, cut to lengths when desired, 2.55c. The warehouse price of No. 10 blue annealed sheets is 2.70c. There is a rumor that all warehouse quotations will be advanced before the end of the week.

Old Material.—The market is unchanged. The demand has somewhat slackened from different sources, but prices continue very firm and advances are indicated at an early date. The minimum prices given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	\$11.00 to \$11.50
Old iron rails	15.75 to 16.25
Relaying rails, 50 lb. and up	21.25 to 21.75
Rerolling steel rails	15.00 to 15.50
Heavy melting steel scrap	14.50 to 15.00
Steel rails for melting	14.25 to 15.25

Per Net Ton	
No. 1 railroad wrought	\$13.75 to \$14.25
Cast borings	7.75 to 8.25
Steel turnings	7.50 to 8.00
Railroad cast scrap	12.00 to 12.25
No. 1 machinery cast scrap	13.75 to 14.25
Burnt scrap	9.00 to 9.50
Iron axles	19.50 to 20.00
Locomotive tires (smooth inside)	13.50 to 14.00
Pipes and flues	10.50 to 11.00
Malleable and steel scrap	11.00 to 11.50
Railroad tank and sheet scrap	9.00 to 9.50

Birmingham

BIRMINGHAM, ALA., Jan. 10, 1916.

Pig Iron.—The market remains at \$15 to \$15.50 for spot and first half and \$16 to \$16.50 for second half, with trading done at both figures, the lower ones predominating. Stocks on hand in the yards in December, and which probably decreased during the month in spite of the tremendous record breaking output, comprised about 100,000 tons each of warrants and free foundry and 25,000 tons of basic. As against this there was in the yards in January, 1914, nearly 500,000 tons, of which 350,000 were free foundry. The year's decrease amounts to over 250,000 tons. Outside of the Sloss-Sheffield company, which has 60,000 to 70,000 tons in its yards (but which is, however, well taken care of by large forward delivery sales), individual company holdings are quite small. The leading interest continues to quote \$15 and \$16 for first and second halves, while the Sloss-Sheffield and the Republic companies hold at 50c. above for first half and the Sloss-Sheffield at 50c. above for second half. The Sloss-Sheffield is understood to have sold its make, 40,000 tons, in December and not to be disposed to sell large quantities even at present figures. Scarcity of several grades remains a factor. The increase in warrants over early fall holdings of 25,000 tons is attributed to confidence in a rising market and furnishes further evidence that re-sale iron has not been affecting prices. The Sloss-Sheffield company reports the completion of the electrification of its 1500-ton brown ore plant at Russellville and a trebling of the water supply there besides starting to rebuild a Sheffield stack. When this stack is ready, about July 1, the twin stack there will likewise be rebuilt. The twin stack of the Alabama company at Ironaton will resume around Feb. 1. This company has options on ore lands adjoining its own near Gadsden, where it has two long-idle furnaces. Borings, which will consume 60 to 90 days, are in progress and, if the findings are satisfactory, the company will take steps to resume iron making at Gadsden. Three Birmingham foundries are making 26 and 30-in. lathes and another smaller turning lathes. We quote

per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$15.50 to \$16.00
No. 2 foundry and soft	15.00 to 15.50
No. 3 foundry	14.50 to 15.00
No. 4 foundry	14.25 to 14.75
Gray forge	14.00 to 14.50
Basic	15.00 to 15.50
Charcoal	23.00 to 23.50

Cast-Iron Pipe.—Active water and gas pipe founders report orders covering operations three months ahead. The reported rise in price in the Middle West was not reflected here the latter portion of last week, present quotations being maintained for business offered. The sanitary shops are working at increased capacity. Pipe fittings are especially active. We quote per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$24; 6-in. and upward, \$22, with \$1 added for gas pipe.

Coal and Coke.—Coke has become stronger and advanced in price. Good standard hand-picked beehive foundry is selling at \$3.75 and run of ovens at \$3.50. These prices put Yolande coke on a level of \$4. By-product, of which there is little available for general use, runs 25c. per ton under beehive. Furnace coke sells 25c. to 50c. under foundry. Some Newcastle coke is going to Mexico. The movement to the Pacific coast is small, but regular. Southern consumption has increased. We quote per net ton f.o.b. ovens, as above stated. Coal is undoubtedly becoming stronger slowly, but nevertheless surely. Railroad consumption is steadily increasing, the river trade is developing and furnace companies are out of the running. Prices have hardened in some instances.

Old Material.—Scrap dealers reflect the generally good conditions in the iron and steel trade. Mills show anxiety to secure the available supply, which is not large. We quote, per gross ton f.o.b. dealers' yards, as follows:

Old iron axles	\$14.50 to \$15.00
Old steel axles	14.00 to 14.50
Old iron rails	13.50 to 14.50
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	9.50 to 10.00
No. 1 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.00 to 10.50
Tram carwheels	10.00 to 10.50
Stove plate	8.00 to 8.50

New York

NEW YORK, Jan. 12, 1916.

Pig Iron.—There has been a fair run of business in Brooklyn and at New Jersey and Hudson River points. Inquiry pending represents probably 4000 tons of foundry iron in this immediate district. The embargo on pig iron to Connecticut points west of New London and Willimantic and south of the Boston & Albany road has been a drawback, but coke is going to New England foundries with little interruption. A new Brooklyn inquiry represents close to 1000 tons. Recent sales in New Jersey have been made by both eastern Pennsylvania and Buffalo furnaces, deliveries being for the most part in the second half, though first and second quarters are represented. A sale of 250 tons for second half is reported on the basis of \$18 at Buffalo for No. 2 X, though it would appear that \$18 is the minimum of most Buffalo sellers for No. 2 plain, \$18.50 being now commonly asked for No. 2 X, while higher prices are obtained on small filling-in lots. Virginia furnaces are generally holding to \$17.25 at furnace for No. 2 X for first half delivery, which amounts to \$20.50 delivered in New England. Buffalo furnaces would need to quote a shade under \$18 at furnace to meet this. The New Jersey steel company, which has been in the market for basic, bought 4000 tons for second and third quarters, 3500 tons going to one furnace company and 500 tons to another. The delivered price was about \$20. The St. Louis steel foundry, which is inquiring through its New York office for 10,000 to 15,000 tons of basic, is likely to buy Southern iron. We quote at tidewater as follows for early delivery: No. 1 foundry, \$20.25 to \$20.75; No. 2 X, \$19.75 to \$20; No. 2 plain, \$19 to \$19.25. Southern iron at tidewater, \$20 to \$20.50 for

No. 1 and \$19.50 to \$20 for No. 2 foundry and No. 2 soft.

Ferroalloys.—British producers of ferromanganese have again advanced their price and the market is very firm. The quotation now stands at \$125, seaboard, an advance of \$25 within six weeks. Inquiries are not numerous nor are sales of any magnitude reported. One representative here of British producers is out of the market until May because no alloy will be available for export before that time. It is believed that receipts in the next three or four months will not be as large as they have been in the past six months, and the latter have only approximated 50 per cent of normal. The reason alleged in some cases is lack of vessel room, though there is also the factor of scarcity of manganese ore. Sales are being made into the last half at the new quotation, but nearly all the product that is being received is shipped on old contracts, many of which extend well into this year. There is evident concern on the part of some consumers and this is not allayed by the last advance in price. Domestic producers for the market are understood to be well sold up for some months to come, and it is known that the output is not now as large as it was two or three months ago. Spot material has recently sold as high as \$150. Ferrosilicon, 50 per cent and higher, is in unusually strong demand, with the supply limited. The last quotation was \$83 to \$85, Pittsburgh.

Finished Iron and Steel.—Sellers are somewhat disquieted over present conditions. Those branches of the steel industry which could take on more work and have some assurance of getting the raw material needed to keep going at a fair rate are disappointed that the holiday dullness has not yet been broken. The proximity to the general securities market, which has been showing a weak tendency, accounts in part for the attitude. Inquiry for railroad cars is not yet encouraging and demand in the East for fabricated steel work is not looking up. Relief in the shipping field is expected to lie for the present at least in storing freight now in cars on terminal piers rented for the purpose and in nearby yards, awaiting the arrival of the greater number of ships which foreign governments must provide for war material. Prices are very irregular, as steel bars, for example, are obtainable practically only in the last half, for which the mills do not care to quote. Not much in plates is possible in less than 60 days, while indeed one Eastern plate mill cannot deliver on new buying earlier than May 1 and another is one month farther behind in deliveries. Quotations as high as 2.75c., Pittsburgh, have been made, in one case for upward of 1500 tons wanted in June—and 2.50c., Pittsburgh, is getting common for larger amounts, even for large tonnage for export. The volume closed at the 2.50c. price is not yet large. A late quotation, in the face of these figures, is reported at 2.35c., Pittsburgh, for a comparatively large amount in 30 to 60 days. Bar iron is up \$2 more a ton, or practically \$8 per ton advance in about a month, although some mills are lagging for the moment. Bar iron for export is selling at 2.25c., base, steamer, New York, in carloads, with higher prices ruling, of course, on special lots or small quantities. Less than 3000 tons of fabricated work closed is noted, including 800 tons for the Elmira Mfg. Company to the McClintic-Marshall Company, and 300 tons for the Mohican Hotel, New London, to Milliken Brothers, Inc., which company is also credited with 1000 tons for power transmission towers for the Pacific Gas & Electric Company. The Texas Company is inquiring for about 10,000 tons of material for four ships which it is to build at the Sewall yard, Bath, Me., which it has acquired. In railroad cars the Pullman Company is reported to have been awarded 500 steel box cars for the Lehigh Valley. The Pressed Steel Car Company, it appears, is to build 100 hopper cars for the Anaconda Copper Mining Company. About 40 passenger equipment cars have been placed, part for the Missouri, Kansas & Texas and part for the Chesapeake & Ohio, and 30 gondolas for the American Steel & Wire Company and 40 ore cars for the Pittsburgh Steel Company. An Eastern trunk line is expected in the market for upward of 1000 cars. We quote mill shipments of steel bars at 2.169c. and higher for moderately prompt deliveries;

plates, 2.419c., New York; structural shapes at 2.069c. and higher, New York, and iron bars at 2.219c. to 2.269c., New York. For warehouse buying we quote iron and steel bars and structural material at 2.50c. and steel plates at 2.60c.

Old Material.—Buying has not yet started since the holiday quiet, but active negotiations are in progress with prices apparently a little unsteady in heavy melting steel. In some quarters some weakness is claimed in No. 1 railroad wrought, but one round sale is noted at \$23 in eastern Pennsylvania, and the price has accordingly been advanced 75c. Light iron is also reported strong. Wrought turnings are not now on a parity with cast borings. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

Railroad steel scrap or equivalent	\$14.50 to \$15.00
Heavy melting steel scrap, yard stock (E. Pa. spec.)	13.00 to 13.50
Relaying rails	21.50 to 22.00
Rerolling rails	16.00 to 16.50
Iron car axles	24.50 to 25.00
Steel car axles	26.50 to 27.00
No. 1 railroad wrought	20.25 to 20.75
Wrought-iron track scrap	18.00 to 18.50
No. 1 yard wrought, long	16.00 to 16.50
No. 1 yard wrought, short	15.00 to 15.50
Light iron	6.00 to 6.25
Cast borings	8.75 to 9.25
Wrought turnings	8.50 to 8.75
Wrought pipe	13.50 to 14.00
Old earwheels	13.50 to 13.75
Malleable cast (railroad)	12.50 to 13.00

Demand from foundries continues strong with No. 1 machinery cast not easy to get and particularly firm. Dealers' quotations to consumers of cast scrap are unchanged, as follows, per gross ton, New York:

No. 1 cast (machinery)	\$16.00 to \$16.50
No. 2 cast (heavy)	15.00 to 15.50
Stove plate	11.50 to 12.00
Locomotive grate bars	11.50 to 12.00

Cast-Iron Pipe.—Heavy demand on the pipe makers is shown clearly in the machinery departments for facing flanges, which departments at the present time are unequal to the requirements. Besides heavy private buying, public lettings are developing. Seattle, Wash., wants about 600 tons, mostly 20-in. pipe, and Baltimore will come in for its annual needs on Jan. 19. On the same day Lawrence, Mass., will take bids on 164 tons

of 4 to 12-in. Prices are strong. Carload lots of 6-in., class B and heavier, are quoted at \$29 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

British Market Strong

Ferromanganese Again Advanced — American Billets and Wire Rods Higher

(By Cable)

LONDON, ENGLAND, Jan. 12, 1916.

The pig-iron market is irregular owing to realizations that France and Italy are inquiring freely. Makers are well booked and are not pressing sales. Hematite iron is neglected at 130s. Tin plates are firm, and makers are unwilling to book forward business with America offering plates for forward delivery.

For 4-in. American billets £11 15s., c.i.f., is bid for first-quarter delivery. For American wire rods afloat £15 5s., c.i.f., is paid. Ferromanganese has been advanced again to £25 loose. We quote as follows, with finished steel prices nominal:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 25s. 6d. to 25s. 9d., compared with 25s. 6d. one week ago.

Cleveland pig iron warrants, 78s. 3d., against 77s. 10d. last week.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 76s. 9d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £18 10s., against £17 15s. last week.

Steel ship plates, Scotch, delivered local yards, £12 10s., compared with £12 last week.

Steel rails, export, f.o.b. works port, £11 5s. nominal.

Hematite pig iron, f.o.b. Tees, 130s.

Sheet bars (Welsh), delivered at works in Swansea Valley, about £12 nominal.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, nominal and unquotable, against £12 5s. as the last quotation.

Steel bars, export, f.o.b. Clyde, £17, compared with £16 10s. nominal last week.

Ferromanganese, f.o.b., £25, loose, compared with £22 15s. a week ago.

Ferrosilicon, 50 per cent, c.i.f., £27.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 73.9c. on plates, structural shapes and sheets and 65c. on wrought pipes and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal is 56.9c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 1.90c. to 2c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	.55
No charge for cutting to lengths 3 ft. and over	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, 6 $\frac{1}{4}$ in. up to 100 in. wide, 1.90c. to 2.25c., base, net cash, thirty days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, $\frac{1}{4}$ in. and over on thinnest edge, 166 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered $\frac{1}{4}$ -in. plates. Plates over 72 in. wide

must be ordered $\frac{1}{4}$ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

	Cents per lb.
Gages under $\frac{1}{4}$ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Rods.—Bessemer, open-hearth and chain rods, \$42, nominally.

Wire Products.—Prices to jobbers: Fence wire, Nos. 0 to 9, per 100 lb., terms sixty days or 2 per cent discount in ten days, carload lots, annealed, \$1.95; galvanized, \$2.65. Galvanized barb wire and staples, \$2.95; painted, \$2.25. Wire nails, \$2.10. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, 67 $\frac{1}{2}$ per cent off list for carloads, 66 $\frac{1}{2}$ off for 1000-rod lots, 65 $\frac{1}{2}$ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.										
Nos.	0 to 9	10	11	12&12½	13	14	15	16		
Annealed	\$2.00	\$2.05	\$2.10	\$2.15	\$2.30	\$2.40	\$2.50	\$2.60		
Galvanized	2.90	2.95	3.00	3.05	3.10	3.25	3.60	3.70		

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Jan. 4, 1916, on iron and steel black and galvanized pipe, all full weight:

Butt Weld										
Steel	Inches	Black	Galv.	Iron	Inches	Black	Galv.			
1/8, 1/4 and 3/8	70	45 1/2		1/8 and 1/4	60	34				
1/2	74	58 1/2		3/8	61	36				
5/8 to 3	77	62 1/2		1/2	65	45				
				3/4 to 1 1/2	68	50				
				2	67	50				

Lap Weld										
2	74	59 1/2		1 1/4	52	34				
2 1/2 to 6	76	61 1/2		1 1/2	63	45				
7 to 12	74	57 1/2		2	64	47				
13 and 14	60 1/2	..		2 1/2 to 4	66	51				
15	58	..		4 1/2 to 6	66	51				
				7 to 12	64	49				

Reamed and Drifted										
1 to 3, butt	75	60 1/2		1 to 1 1/2, butt	66	48				
2, lap	72	57 1/2		2, butt	65	48				
2 1/2 to 6, lap	74	59 1/2		1 1/4, lap	50	32				
				2, lap	61	43				
				2 1/2 to 4, lap	62	45				
				2 1/2 to 4, lap	64	49				

Butt Weld, extra strong, plain ends										
1/8, 1/4 and 3/8	66	49 1/2		1/8	58	42				
1/2	71	58 1/2		1/2	63	50				
3/4 to 1 1/2	75	62 1/2		3/4 to 1 1/2	67	52				
2 to 3	76	63 1/2		2 and 2 1/2	67	53				

Lap Weld, extra strong, plain ends										
2	72	57 1/2		1 1/2	62	46				
2 1/2 to 4	74	59 1/2		2	64	48				
4 1/2 to 6	73	58 1/2		2 1/2 to 4	66	51				
7 to 8	67	50 1/2		4 1/2 to 6	65	50				
9 to 12	62	45 1/2		7 to 8	58	43				
				9 to 12	53	38				

Butt Weld, double extra strong, plain ends										
1/2	61	48 1/2		1/2	53	39				
3/4 to 1 1/2	64	51 1/2		3/4 to 1 1/2	56	42				
2 to 2 1/2	66	53 1/2		2 and 2 1/2	57	44				

Lap Weld, double extra strong, plain ends										
2	62	49 1/2		2	54	37				
2 1/2 to 4	64	51 1/2		2 1/2 to 4	56	44				
4 1/2 to 6	63	50 1/2		4 1/2 to 6	55	42				
7 to 8	57	40 1/2		7 to 8	48	32				

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms thirty days net, or 2 per cent cash discount in ten days from date of invoice:

Blue Annealed Sheets										
Nos. 3 to 8										Cents per lb.
Nos. 9 to 10										2.35 to 2.45
Nos. 11 and 12										2.40 to 2.50
Nos. 13 and 14										2.45 to 2.55
Nos. 15 and 16										2.50 to 2.60
Nos. 17 to 21										2.60 to 2.70
Nos. 22 and 24										2.45 to 2.55
Nos. 25 and 26										2.50 to 2.60
Nos. 27										2.55 to 2.65
Nos. 28										2.60 to 2.70
Nos. 29										2.65 to 2.75
Nos. 30										2.75 to 2.85

Box Annealed Sheets, Cold Rolled										
Nos. 10 and 11										2.25 to 2.35
No. 12										2.25 to 2.35
Nos. 13 and 14										2.30 to 2.40
Nos. 15 and 16										2.35 to 2.45
Nos. 17 to 21										2.40 to 2.50
Nos. 22 and 24										2.45 to 2.55
Nos. 25 and 26										2.50 to 2.60
No. 27										2.55 to 2.65
No. 28										2.60 to 2.70
No. 29										2.65 to 2.75
No. 30										2.75 to 2.85

Galvanized Sheets of Black Sheet Gage										
Nos. 10 and 11										3.75 to 4.00
No. 12										3.85 to 4.10
Nos. 13 and 14										3.85 to 4.10
Nos. 15 and 16										3.95 to 4.20
Nos. 17 to 21										4.10 to 4.35
Nos. 22 and 24										4.30 to 4.55
Nos. 25 and 26										4.45 to 4.70
No. 27										4.60 to 4.85
No. 28										4.75 to 5.00
No. 29										4.90 to 5.15

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded

steel tubes and standard charcoal-iron tubes, effective from Jan. 7, 1916, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1 1/2 in.	45
1 1/2 and 2 in.	57
2 1/4 in.	54
2 1/2 and 2 1/4 in.	60
3 and 3 1/4 in.	65
3 1/2 to 4 1/2 in.	66
5 and 6 in.	59
7 to 13 in.	56

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Iron and Industrial Stocks

NEW YORK, Jan. 12, 1916.

Important recessions have occurred in stock values. While other influences may have been actively at work to depress prices, the publication of Judge Gary's views regarding possible conditions after the war was seized upon as an important bearish factor. The range of prices on active iron and industrial stocks from Tuesday of last week to Tuesday of this week was as follows:

Allis-Chal, com.	25 1/2 - 31 1/2	Republic, pref.	108 1/2 - 110
Allis-Chal, pref.	78 1/2 - 82	Sloss, com.	58 - 62
Am. Can, com.	59 1/2 - 64 1/2	Pipe, com.	23 - 24
Am. Can, pref.	112 - 112 1/2	Pipe, pref.	49 - 51 1/2
Am. Car & Fdy, com.	65 1/2 - 75 1/2	U. S. Steel, com.	85 1/2 - 88
Am. Car & Fdy, pref.	117 1/2 - 118 1/2</		

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

Jan.	Lake	Copper, New York		Lead		Spelter	
		Electro- lytic	Tin New York	New York	St. Louis	New York	St. Louis
5	23.75	23.25	43.50	5.75	5.70	17.30	17.15
6	24.00	23.50	42.25	5.75	5.70	17.30	17.15
7	24.00	23.62½	41.87½	5.90	5.80	17.50	17.25
8	24.00	23.75	41.50	5.90	5.80	17.50	17.25
10	24.00	23.87½	41.50	5.90	5.75	17.50	17.25
11	24.00	23.87½	41.50	5.90	5.75	17.50	17.25

NEW YORK, Jan. 12, 1916.

Copper is strong at higher levels, but on the surface business appears to be quieter. Tin is easier in a dull market. Lead shows a tendency toward weakness, but the New York quotation is unchanged. Spelter is quiet and prices show little change. Antimony is strong but not notably active.

New York

Copper.—The market is somewhat difficult to gage because of contradictory reports, both as to quotations and the available supply. It was certain yesterday, however, that Lake was nominal at 24c., while 23.87½c., cash, New York, was quoted for electrolytic. On Jan. 5, 24c., full terms, was paid for electrolytic for January or February delivery. Later positions, of course, were lower. The following day it was reported that no electrolytic was to be had from first hands this side of April, while the Lake producers were reported sold up to June 1. On the other hand other rumors had it that Lake could be had for first quarter delivery at around 23.25c., full terms. The export demand has been steady, with France the principal buyer. A disquieting report now current, as yet unconfirmed, is that Great Britain will limit buying within her borders and also fix the maximum price to be paid. This is understood to be £100 for electrolytic, whereas the actual market is £114. It is reported that the 60,000 tons for 1916 delivery, which Great Britain bought recently, will be supplied to munitions makers on the basis referred to. Great Britain, however, is not saying much about her plans. Usually they are not known until the effects are felt. The month's exports, including yesterday, total only 4884 tons.

Tin.—The week has been dull almost continuously, although on Friday between 200 and 300 tons of far futures changed hands. Not only have consumers shown little interest, but business was rendered practically impossible by the delays in transatlantic communication. For some reason, cables from the other side in the past few days have been held up for hours and when they arrived were too late for action. Spot tin was quoted yesterday at 41.50c. The arrivals this month, up to yesterday, total 2010 tons and there is afloat 6115 tons.

Lead.—Last week the market was very strong and on Friday the leading interest announced an advance of \$3 per ton, or from 5.75c. to 5.90c., per lb., New York. At that time the trade believed that the quotation would reach and pass 6c., but developments of this week make it believe that probably the apex has been reached for the present. The situation in Great Britain resembles that in copper, the government evidently intending to regulate quantities sold, and to fix maximum prices. This had the effect of causing St. Louis to weaken, and if this tendency continues it will react on New York. It is certain that in the past few days thousands of tons of lead have been purchased, Europe being the best buyer. Deliveries on these sales will run through 1916. Independents easily obtained premiums. The month's exports, including yesterday, total 1048 tons.

Spelter.—The market has been quiet and lacking in features of interest. Ordinarily it would be expected that spelter would share the activity of copper, and this it probably would have done were it not for the heavy buying of two or three weeks ago. The quiet was ren-

dered more pronounced by the strikes which have tied up some of the large steel plants at Youngstown. Prime Western is quoted at 17.50c., New York, and 17.25c., St. Louis, with some offerings of odd lots at concessions. Brass mill special is quoted at 19.50c. and is growing more difficult to obtain. February is quoted at 16.25c., and March at 15.50c. Second quarter ranges from 13.50c. to 14c. The exports this month, including yesterday, total 1191 tons.

Antimony.—Spot Chinese and Japanese grades are quoted at 41c. to 42c. The market is quiet but strong. The future supply appears to be uncertain.

Aluminum.—The quotations for No. 1 aluminum, 98 to 99 per cent pure, ton lots, range from 54c. to 56c.

Old Metals.—The advance continues and the market is fairly steady at the higher level. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	20.50 to 21.00
Copper, heavy and wire	20.00 to 20.50
Copper, light and bottoms	17.50 to 18.00
Brass, heavy	13.00 to 13.50
Brass, light	11.00 to 11.50
Heavy machine composition	15.50 to 16.00
No. 1 yellow rod brass turnings	14.00 to 14.50
No. 1 red brass or composition turnings	14.00 to 15.00
Lead, heavy	5.25
Lead, tea	5.00
Zinc	12.00 to 14.00

Chicago

JAN. 10.—The advance in copper, under way a week ago, continued into last week, but has been followed by a recession, leaving prices as last quoted. The feature of the week was the advance of \$8 per ton in the price of lead. We quote: Casting copper, 22.50c.; Lake copper, 23.50c.; tin, carloads, 42c., and small lots, 44c.; lead, 5.85c.; spelter, 17.25c.; sheet zinc, nominally, 22c.; Cookson's antimony, 50c.; other grades, 45c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 17.50c.; copper bottoms, 16.75c.; copper clips, 17.50c.; red brass, 15.50c.; yellow brass, 13.50c.; lead pipe, 4.90c.; zinc, 13c.; pewter, No. 1, 25c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

JAN. 10.—Conditions have continued firm as to price, with the demand well maintained. Quotations closed to-day as follows: Lead, 6.10c.; spelter, 19c.; tin, 45c.; Lake copper, 24.50c.; electrolytic copper, 24.25c.; Asiatic antimony, 46c. In the Joplin ore market the demand for zinc blende held well and prices were firm, with the range \$80 to \$115 per ton, compared with \$48 to \$52.50 a year ago. Calamine was quoted at \$70 to \$80, as compared with \$22 to \$23 a year ago. Lead ore was firm at \$72, against \$47 a year ago. Average values for the district for the week were: Zinc blende, \$94; calamine, \$63, and lead, \$71, on settlements. Miscellaneous scrap metals are quoted as follows: Light brass, 7.50c.; heavy yellow brass, 9.50c.; heavy red brass and light copper, 11c.; heavy copper and copper wire, 13c.; zinc, 7.50c.; lead, 4c.; pewter, 21c.; tinfoil, 30c.; tea lead, 3.50c.

Insurance for All Employees

The Robbins & Myers Company, Springfield, Ohio, manufacturer of electrical equipment, has insured the life of every employee in its factory, office and branch houses under a blanket policy that requires no physical examination. In this way many employees who would be refused by the old line companies are enabled to secure insurance. The amount of the policy increases with the length of time of service as follows: One year or less, \$500; one year and under two, \$600; two years and under three, \$700; three years and under four, \$800; four years and under five, \$900; five years and over, \$1,000.

The quicksilver output in the United States in 1915, according to preliminary figures of the U. S. Geological Survey, was 20,681 flasks of 75 lb. each, compared with 16,548 flasks in 1914. The war demand for mercury as a fulminant in explosives caused the increase.

TIN SMELTING AT PERTH AMBOY

Bolivian Concentrates the Basis of a New Industry

In *Commerce Reports* for Jan. 6, issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce, is announced the establishment of an entirely new industry in the United States. All arrangements have been completed for the importation of Bolivian tin ore by the American Smelting & Refining Company, and a plant has been erected at Perth Amboy, N. J., for smelting and refining the raw material. The first definite information that such an undertaking had been decided upon was contained in a letter to Secretary Redfield from William Loeb, Jr., of the company named.

The Bolivian tin, according to Mr. Loeb's letter, contains impurities which, with the established methods of smelting, do not produce a tin suitable for tin plate, but the plant at Perth Amboy proposes not only to smelt the impure ores from Bolivia and other countries but to refine the product by the electrolytic process. A recent analysis of this electrolytic tin by experienced chemists showed it to run 99.98 per cent pure, while the base metal from which it was produced contained only 93 per cent. For the manufacture of tin plate this tin is pronounced as good as the best Straits tin.

"In addition to building the plant and purchasing the South American tin ores," writes Mr. Loeb, "we are financing the miners by making liberal advances immediately on shipments from South America. We hope eventually to be able to extend our present plant and increase the business considerably. In the initial steps of our negotiations to secure these tin ores, we were greatly helped by the co-operation of the chief of your Bureau of Foreign and Domestic Commerce, the commercial attaché of the department in South America, and by the State Department."

Although the United States is easily the greatest user of tin, only a very small quantity of the metal is mined in this country and practically no smelting has been done here. In normal times the United States imports about \$50,000,000 worth of tin, which is somewhat more than a third of the world's production.

An official of the American Smelting & Refining Company states that the Perth Amboy plant is complete, and operations will begin in a few days. It is understood that a shipment of Bolivian concentrates has arrived, and would have been available earlier were it not for the interruption to traffic through the Panama Canal.

It is expected that difficulties will be encountered in the new enterprise, but it is not doubted that these will be overcome by the experts in charge of the work. The company has been allowed one patent for the electrolytic refining of tin, and others are pending.

Dr. Pratt, chief of the Bureau of Foreign and Domestic Commerce, states that it is difficult to estimate the full importance of the establishment of a tin smelting industry in the United States. The work itself will give employment to a large force and will be a great convenience in many ways to the tin-plate industry. It is pointed out that the purchase of great quantities of ore from a South American country will establish credits in our markets in favor of South American merchants and manufacturers, and lead to the establishment of commercial relations which otherwise would have been difficult to effect. The Bolivian minister, Senor Calderon, calls attention to this important point, emphasizing the necessity of buying in foreign countries if we are to sell there. The ships that bring ore to the United States will carry back American products for South American markets.

As an aviation field the Packard Motor Car Company has acquired a large tract of land on Lake St. Clair, near Mount Clemens, Mich. Tests with the view of proving the value of the 12-cylinder motor for aeroplane use have been in progress for six months, but the company does not contemplate the manufacture of complete aeroplanes, at least for the time being.

Standardizing the Cost of Power

At a meeting of the American Society of Mechanical Engineers held on Jan. 11 at the Engineering Societies Building, 29 West Thirty-ninth Street, New York City, Walter M. Polakov presented a paper on "Standardization of Power Plant Operating Costs." The aim of the paper, which is printed substantially in full on page 142, is to outline a method by which the owner of a power plant can, without the necessity of studying the technical details of operation, gage how close the actual performance of the plant is to the possible minimum cost at any time or under any circumstances, all variable factors beyond operating control being automatically adjusted.

The discussion which followed the presentation of the paper was along two distinct lines. That presented by the representatives of the central stations was unfavorable to the paper, the principal points brought out being that the term standardization was a misnomer and that the cost of production, as understood by central station operators, does not include fixed charges, depreciation, taxes, interest, etc., which do enter into the cost of power. Engineers representing other interests commended the paper, stating that owners of plants generally are ignorant of what the power they use actually costs and tremendous savings could be made by education. A point brought out by one of the speakers was that the determination of the standard for the best existing conditions was important, as it enabled an owner to judge just how well his plant was being operated.

New Prices on Tin and Terne Plate

On the basis of the advance to \$3.75 for 100-lb. coke tin plates at Pittsburgh the list for tin and terne plate, as recently adopted by most of the manufacturers, is as follows:

Coke Tin Plate, 14 x 20		
100-lb.	Terne Plate, 20 x 28	\$3.75
I.C. 107-lb.	Coating	3.90
Base Wt.	Net Wt.	Price
100-lb.	230	\$6.90
I.C.	214	7.20
IX	270	9.00
I.C.	218	8.40
I.C.	221	8.90
I.C.	226	9.70
I.C.	231	10.70
I.C.	236	11.50
I.C.	241	12.50
I.C.	246	13.50

Crosses—90 cents for each cross, added to price for 100 x 28.

Pure palm oil process—Extra of \$1 for 20 x 28.

Odd sizes—Regular sizes are 14 x 20 and 20 x 28 only; other sizes 10c. extra, unless order is for 100 base boxes per item, for shipment in 50-box lots not over 60 days apart.

Iron, Copper and Zinc Ores in 1915

Iron-ore shipments from the mines of the United States in 1915, according to the usual preliminary estimates of the U. S. Geological Survey, are estimated to have exceeded 55,000,000 gross tons, an increase of more than 38 per cent over 1914. The pig-iron increase is put at 6,500,000 tons, the output for 1914 having been 23,332,244 tons. The copper mines surpassed all records, the 1915 output having an estimated value of \$236,000,000 or \$83,000,000 more than the 1914 production. The output of zinc from domestic ores is estimated as larger than ever before, being about 425,000 tons, worth \$120,000,000 as compared with 343,418 tons in 1914.

The Richardson-Phenix Company, lubrication engineer and manufacturer, Milwaukee, Wis., has opened a branch office in Boston, Mass., located at 141 Milk Street, to take care of its increasing business in New England. It is in charge of Charles E. Blake, who has had long experience with the company in the design and installation of power plant lubricating systems. The company also announces the removal of its New York office to 30 East Forty-second Street. E. M. May, manager of this office, now has associated with him J. J. May, who will devote his energies to the NoKut valve department.

The Dominion Company in 1915

Improvements of the Dominion Iron & Steel Company, Ltd., Sydney, Capt Breton, in 1915 included installing a plant for the recovery of benzol and other products at its by-product coke plant; also the erection of a 16-in. two-high rolling mill. Additional equipment was provided for the wire and nail shops to permit the drawing of finer wires and to enlarge the capacity of the nail and fence departments. Three steamers were purchased by a subsidiary company to provide tonnage suitable for growing export trade. A statement recently issued by the company comments as follows on the developments of the past year:

Our notes on the operations of the company for the year 1914 contained indications of hopefulness which were not unmixed with doubt. The business which the company had built up, principally in Canada, was practically suspended. The new business which has been undertaken across the ocean, in Great Britain and France, was still in its initial stages. Prices were low, freights were high and ships scarce and hard to get, even at much above any rates that had previously been known. Buyers in those countries were critical and inclined to doubt Canada's ability to furnish materials of the quality and in the form that would suit their somewhat exacting requirements. As the year 1915 closed there has been a change in most of these conditions. Prices have advanced, users of Canadian steel in Britain and France are no longer doubtful of its quality and their orders are freely given for all the material that can be spared. The transportation problem is even more difficult than it was a year ago, but it has not yet become impossible of solution. The output of the various forms of iron and steel in the year 1915 was approximately as follows: Pig iron, 309,800 tons; steel ingots, 349,000 tons; blooms, billets and slabs for sale, 119,999 tons; rails, 57,500 tons; wire rods, 73,500 tons; merchant bars, 78,000 tons; wire and products of wire, 34,000 tons.

The greater part of the pig iron produced was used in the manufacture of steel, but during the year about 13,000 tons was shipped to foundries in Canada. The steel ingots were converted into the other forms of steel and practically all was sent to market during the year except what may be on hand awaiting shipment. It is interesting to note how the character of the output has changed with the demands of a changing market. In the first place the basic products, pig iron and steel ingots, have increased 70 per cent and 47 per cent respectively. Sales of blooms, billets and slabs, including steel required to produce shell blanks, increased five-fold; output and disposal of wire rods increased 95 per cent; wire and products of wire, such as nails, increased 30 per cent. On the other hand there was a decrease of 52 per cent in the output of rails, and the quantity of merchant bars turned out in 1915 was only about half the quantity shown in the previous year's returns. The distribution between deliveries in Canada and exports expresses in a very striking way how entirely the character of the company's business has changed. In the year 1914 67 per cent of the sales of the steel was for consumption in Canada and only 33 per cent was for export. In the year 1915 66 per cent was in the form of materials to be exported and only 34 per cent was for home consumption.

Indications are for unparalleled activity for the Canadian steel trade for the year 1916. The mills are booked for months ahead. The ending of the war even six months from now, according to producers, would not adversely affect them to any great extent, for the reason that a large percentage of the products of the mills for the next half year will go into the munitions of war. The contrast between the business of the Dominion Steel Corporation in December, 1914, and December, 1915, is shown in the following statistics of output:

	Dec., 1914	Dec., 1915
Pig iron	12,598 tons	34,768 tons
Steel ingots	19,699 tons	35,767 tons
Rails	3,349 tons	—
Wire rods	3,763 tons	9,685 tons
Wire and wire products	3,836 tons	5,564 tons
Coal	317,117 tons	436,239 tons

The Allied Machinery Company of America, 55 Wall Street, New York, announces a change in the address of its Paris office. It is now located at 19 Rue de Rocroy. In making the change the company has acquired a large and centrally situated showroom combined with a commodious office. The new quarters are in the vicinity of the Gare du Nord and in the center of the machinery district.

NEAR TO THE LIMIT OF 1500

American Iron and Steel Institute Will Elect New Members Only to Vacancies

The directors of the American Iron and Steel Institute at their meeting on Jan. 6 elected eight new members. As has been stated, the active membership list of 1250 has been full for some time and the associate membership list of 250 now has only eight vacancies. The directors decided not to increase the number of members in either class. Temporarily some members eligible to active membership are being elected as associate members. When that list shall have become full no more members will be elected except to fill vacancies. In the list given below are the members elected Jan. 6. Those placed temporarily on the associate list to be transferred to the active list as vacancies occur are indicated by an asterisk (*).

*Dulin A. Barrett, district manager American Sheet & Tin Plate Company, Vandergrift, Pa.

*Thomas Cantley, president and general manager Nova Scotia Steel & Coal Company, Ltd., New Glasgow, N. S.

Clarence R. Marchant, *Manufacturers' Record*, Baltimore. William L. Niekamp, president Beck & Corbitt Iron Company, St. Louis.

John Ruddiman, vice-president and sales manager Issley Doubleday Company, New York.

*Bertram S. Stephenson, resident agent M. A. Hanna & Co., Pittsburgh.

*W. P. Burden, Burden Iron Company, Troy, N. Y.

*Daniel W. Tallcott, manager Burden Iron Company, Troy, N. Y.

The board decided to increase the admission fee from \$5 to \$20 and the annual dues from \$10 to \$20, effective with the beginning of the new institute year, May 1, 1916.

It was tentatively decided to hold the spring meeting in New York on Friday and Saturday, May 26 and 27. The following committee on arrangements was appointed: James A. Farrell, chairman, E. A. S. Clarke, John C. Maben, Charles M. Schwab, John A. Topping, Frank S. Witherbee and James A. Burden.

Phillips Mfg. Co. Sublets Orders

Several changes in the execution of contracts for shrapnel fuses and detonators which were to have been filled by the R. B. Phillips Mfg. Company have been confirmed by a director of that company. The American Ammunition Company has taken over the contract for shrapnel fuses valued at \$1,459,000 which the Phillips Company was to fill at Worcester in the plant of the Critchley Machine Screw Company. To fulfill the contract the Phillips interests took over the Critchley plant. The work will be done there by the American Ammunition Company.

The contract for 1,000,000 Russian detonators valued at \$2,600,000, which was to have been executed by the Phillips Company at its Lowell plant, will be taken over by the International Steel & Ordnance Company and completed in the Phillips shops in that city.

The reason given by Worcester officials for the subletting of the orders is that the fuses are wanted badly and that the company will be relieved of having to raise over \$500,000 working capital necessary for equipment. It is understood that the first deliveries of the product being turned out in the Worcester shops were made last week and that there is but about six months more to elapse before the order must be filled.

The contracts for the Worcester and Lowell plants have been leased out to the other concerns with the provision that a good percentage of profits shall accrue to the lessor.

About 450 men are working on the Worcester order. Work is going on night and day, and is carried on on the two top floors of the Phillips plant and in an ell recently added.

The decision of the Gulf States Steel Company to offer \$1,575,000 of treasury stock to stockholders is taken to forecast the plans of the company to build a by-product coke plant and otherwise extend operations.

FOR A TARIFF COMMISSION

The Movement Apparently Stronger at Washington Than Ever Before

WASHINGTON, D. C., Jan. 12, 1916.—The reassembling of Congress after the holiday is the signal for launching a comprehensive movement to obtain legislation creating a permanent non-partisan tariff commission. The movement will be engineered by the Tariff Commission League, organized in Chicago last summer and embracing in its membership many well-known manufacturers, railroad men, financiers and economists. The interest of Congress in the proposal has never been so deep as at present. This feeling is manifested in more than a score of bills which have been introduced since the beginning of the session by Republican, Democratic and labor Representatives from the North, East, South and West. The Chamber of Commerce of the United States, after an exhaustive referendum, has indorsed the project and will undoubtedly give the movement a decided impetus by action to be taken at its annual convention to be held in this city early in February. A special committee of the National Chamber will be instructed to co-operate in this work and will no doubt render effective service in securing favorable consideration for the project at the hands of Congress.

POLITICAL AND NON-POLITICAL PHASES

The promoters of this movement find the chief obstacle to its success to be a very general misapprehension as to the character and functions of the proposed commission, even among public men more or less familiar with tariff problems. The impression is quite general that a tariff commission must be a more or less partisan body sympathizing with the party in power in its views regarding the principles of protection, free trade, or the various intermediate gradations embraced in the general term of "tariff reform." The proposed tariff commission is designed to be an entirely different sort of body. The determination of tariff policies is a political question. Duties on imports constitute a tax. Whether or not a tax is to be levied and whether the tax should be heavy or light for the protection of American industry or solely for revenue purposes are political questions for the determination of Congress. What the rates of duty on specific articles should be in order to accomplish the policy established is an involved technical and economic question which, owing to frequent changes in conditions in this and foreign countries, requires constant expert investigation as a basis for change in duty to accord with tariff policies. This expert investigation is to be the function of the commission which is to be charged with no responsibility respecting the tariff policies to be pursued by Congress.

Under the present system practically all the investigation that precedes the drafting of a new tariff law is prosecuted by the Ways and Means Committee, none of whose members have any technical knowledge or special equipment fitting them for the task. Hurried committee hearings at which interested parties appear and submit their own statistics are in no sense a satisfactory substitute for impartial, continuous investigation of conditions here and abroad. The existing tariff law covers more than 4000 specified articles, divided into fourteen schedules. It would be impracticable to have all the industries of the country represented by commissioners, but it would be comparatively easy for a small, compact commission to direct the work of any necessary number of investigators and to prepare their reports for submission to Congress. On this basis it is proposed that the tariff commission shall consist of five, or possibly seven, members to be appointed by the President, with reasonably long tenure of office and liberal compensation.

THE COMMISSION'S DUTIES.

The chief duties of the commission will be to investigate the cost of production of all articles the subject of tariff legislation, with special reference to the prices paid domestic and foreign labor, the cost of raw

materials, producers' prices and retail prices of commodities, and the condition of domestic and foreign markets affecting the American products, together with all other facts which may be necessary or convenient in fixing import duties or in assisting in the administration of the customs laws.

It is not the present purpose of the majority leaders in Congress to attempt any modification of the existing tariff laws beyond the passage of a joint resolution restoring to the dutiable list the single item of sugar, which otherwise would become free of duty on May 1 next. The advocates of a tariff commission suggest that it would be a very simple matter to add a provision to this general revenue bill creating a commission with the limited powers outlined. Such a commission would be able to organize and obtain a vast amount of valuable information in time for the next revision of the tariff, which, regardless of the outcome of the elections of 1916, is regarded as inevitable in the near future.

W. L. C.

February Meeting of the Mining Engineers

The American Institute of Mining Engineers will hold its 112th meeting in New York, Feb. 14 to 17. The usual technical sessions will take place and the program of the iron and steel section, as far as made up, is as follows:

The Control of Chill in Cast Iron, by G. M. Thrasher.
Measurement of the Temperature Drop in Blast-Furnace Hot-Blast Mains, by R. J. Wysor, chief chemist, Bethlehem Steel Company.

Washed Metal, by H. D. Hibbard, consulting engineer, Plainfield, N. J., and E. L. Ford, general manager, Youngstown Steel Company.

Manganese-Steel Castings in the Mining Industry, by Walter S. McKee, vice-president American Manganese Steel Company.

Magnetic Studies of Mechanical Deformation in Certain Ferromagnetic Metals and Alloys, by H. Hanemann and P. D. Merica.

Effect of Carbon on the Physical Properties of Heat-Treated Steel, by J. H. Nead, metallurgical chemist, Belle City Malleable Iron Company.

The Determination of Grain Size in Metals, by Zay Jeffries, A. H. Kline and E. B. Zimmer, Case School of Applied Science, Cleveland, O.

Metallography of Steel for U. S. Naval Ordnance, by H. E. Cook.

A Chemical Explanation of the Effect of Oxygen in Strengthening Cast Iron, by W. McA. Johnson, consulting engineer, New York.

Trials of Ferrotitanium in Acid Open-Hearth Steel Castings, by Edwin F. Cone, editorial staff, THE IRON AGE.

The Iron Mines of the Sierra Morena District of Spain, by Victor de Ysasi.

The annual dinner will be given Wednesday evening, Feb. 16, at the Hotel Astor. An all-day boat excursion is scheduled for Thursday, given by the courtesy of the Secretary of the Navy on a naval vessel. The firing of some of the large army guns will be witnessed at some point in the harbor.

In sixty-one shipbuilding yards of the United States, including seven of the United States Navy, there were, according to the *Journal of Commerce*, New York, at the end of 1915, 343 vessels under construction or contract. The total tonnage of 208 of them was 1,071,600 tons, in large part for merchant service. Of 116 naval vessels under construction, sixty-one are submarines, 8 battle ships and 16 destroyers. Of these seventy-two are for the United States Government. The general list includes fifty-seven general cargo vessels and eleven so-called freighters, all of larger tonnage than usually found in American yards, averaging over 10,000 tons, with two of 13,000 tons, and fifty oil carriers.

The Interlake Steamship Company, Cleveland, Ohio, has announced plans for financing the recent purchase for a cash consideration of \$3,047,000 of the Mitchell fleet of lake boats. Part of the amount required will be derived from the sale of about 7000 shares of unissued treasury stock at \$120 a share and part from the proceeds of \$1,600,000 five-year 5 per cent notes sold to Cleveland and New York bankers.

EMPLOYEES PROFIT-SHARING

Cleveland Twist Drill Company's First Distribution 10½ Per Cent on Wages

The Cleveland Twist Drill Company, Cleveland, Ohio, has adopted a profit-sharing plan under which its employees will share with the stockholders in the net earnings. The adoption of this plan will not in any way affect the rate of employees' wages or salaries. The first division of profits under it will take place within the next few days, when those who have been in the employ of the company since July 1, 1913, will receive cash dividends amounting to 10½ per cent of their year's wages. The plan as adopted by the board of directors on Dec. 30 and later approved by the stockholders of the company, is in substance as follows:

Before any profits are divided with the employees, the stockholders shall receive 8 per cent per annum. When such 8 per cent interest has been paid to the stockholders in any calendar year, all cash dividends declared in that year will be divided between stockholders and employees, the stockholders sharing according to their holdings and the employees according to the amount of salary or wages earned during the twelve months ending with June 30 of that year. Employees continuously in the service of the company for at least two years prior to July 1 are to receive dividends based on their aggregate earnings at the same rate as the stockholders. Employees who have been in the service of the company for more than one year and less than two years will get three-fourths of that rate, and employees who have served continuously for less than one year will get one-half the rate of the stockholders. Dividends that have accrued to employees will be distributed once a year, in December, excepting that the dividends for the year 1915 will be distributed in the present month.

No person will be entitled to a share in these dividends unless he is a bona fide employee of the company and in good standing at the time of the distribution, except that employees laid off owing to lack of work to sickness will be entitled to dividends accruing in any year on the wages earned by them during the twelve months ending June 30 of that year. Employees voluntarily leaving the service of the company or discharged will forfeit their right to the accrued dividends. Any employee who receives a commission from the company or any share in the profits other than provided for in this plan (except through dividends on stock if a stockholder) shall thereby be rendered ineligible to receive the dividends under this plan.

As the plan is purely voluntary on the part of the company it reserves the right to make such changes as the directors may consider desirable for the best interests of the organization. It is further stipulated that the adoption of the plan does not deprive the company of the right at any time to discharge an employee who may be receiving benefits under it, and thereby terminate his participation in the profit sharing.

Dividends to employees are to be paid by the Novo Engine Company, Lansing, Mich., on March 1. For those who were employed throughout the year the dividend will be 5 per cent of the year's wages, while for those who have been employed continuously for a period of six months since July 1, 1914, the dividend will be 2½ per cent. Approximately 175 employees, it is stated, will share in the distribution.

It is announced that the business of S. A. Ashman & Son Company, 2300 East Tioga Street, Philadelphia, forgings and machine work, will be carried on by the following officers: President, Edgar Ashman; secretary and treasurer, William W. Sketchley; assistant secretary, William H. Clark, Jr. Stephen A. Ashman, head of the company, died Dec. 22.

The Texas Company has apparently decided to become its own shipbuilder. It has acquired a shipyard at Bath, Me., and is planning to start early on building four tank steamers for transporting oil. About 10,000 tons of ship steel will be required for the four boats.

Low Phosphorus Steel from High Phosphorus Ores

Alva C. Dinkey has been awarded a patent (U. S. 1,162,755—Dec. 7, 1915) the object of which is stated to be to provide a process of making low phosphorus steel from iron containing phosphorus above the permissible or specified limit. The practice recommended is as follows:

A quantity of limestone and ore or other oxide of iron is charged into a furnace, the limestone amounting to about 5 per cent and the ore to about 15 or 20 per cent by weight of the metal to be treated. The charge is heated until it is at a red heat or is pasty or even fused, depending on its nature. The charge of pig iron in a molten condition is then poured into the furnace as rapidly and as nearly at one time as possible. This causes an active reaction and a rapid production of basic slag; and the materials being at a comparatively low temperature, the iron oxide oxidizes the phosphorus, silicon and manganese in the pig iron with extreme rapidity and at the same time oxidizes a slight portion of the carbon. At the end of about one hour the phosphorus will be substantially eliminated; that is, reduced to about 10 per cent of its original content. After the slag formed has been preferably removed, the furnace is tapped and the partly refined metal removed to a mixer or a storage vessel for subsequent treatment in acid Bessemer converters. The iron will be treated in the preliminary furnace in about 50 to 100-ton lots, and as the storage vessel has a much greater capacity, a large quantity of partly refined metal can be stored. An acid open-hearth furnace may be employed instead of the Bessemer converter for refining.

By using heats of known quantities and compositions, mixtures of metal having varying percentages of phosphorus are readily obtainable, it is claimed, to suit particular requirements.

British Iron and Steel Statistics

Statistics of the iron and steel production in Great Britain, which have been admittedly unsatisfactory and incomplete for a long time, are about to be put on a better footing. The collection and tabulation is to be undertaken by the Iron and Steel and Allied Trades Federation which has established a statistical bureau in London to be under the supervision of G. C. Lloyd, secretary of the Iron and Steel Institute. Until the fall of 1914 this work was carried on by the British Iron Trade Association. The London *Iron and Coal Trades Review*, in commenting on the new plan, says that "the securing of returns from manufacturers—a purely voluntary act—is largely a question of the confidence which the individual producer feels in the head of the statistical bureau and his staff. Mr. Lloyd has, we believe, the confidence of the trade."

Indian Manganese-Ore Exports Larger

Manganese-ore exports from India in September, 1915, are given as 66,000 gross tons, as compared with 12,830 tons in September, 1914. Of the 66,000 tons, Italy took 3900 tons, the remainder going to Great Britain. The September figures are the largest for any month in 1915, the total to Aug. 1, 1915, being 122,403 or 17,486 tons per month. For the seven months to Aug. 1, 1914, the total was 402,853 tons or 57,550 tons per month. Receipts in Great Britain, therefore, are by no means normal.

The Trumbull Steel Company, Warren, Ohio, is considering the erection of a steel plant to consist of open-hearth furnaces and a sheet bar mill but has not yet definitely decided whether it will go ahead with such extensions.

The Alabama Company, Birmingham, Ala., has an option on the Hammond ore property near Gadsden, Ala., and is drilling. If results are satisfactory the property will be purchased and active mining operations begun.

IRON AND STEEL WAGE ADVANCE

Steel Corporation Increase of 10 Per Cent to Common Labor Made General

Chairman E. H. Gary of the United States Steel Corporation made the following announcement on Thursday, Jan. 6, following a special meeting of the Finance Committee:

In view of the prosperous conditions now existing it was unanimously voted at a meeting of presidents of our iron and steel companies, held to-day, to recommend that there should be made readjustment of the wage rates to take effect Feb. 1; and at a subsequent meeting of the Finance Committee it was unanimously decided to adopt the recommendations of the presidents. It is proposed to increase the rates of common labor about 10 per cent. As to other departments, increases will be equitably proportioned. Adjustments in wage rates in our mining companies are under consideration.

The increase for ordinary labor will bring an hourly wage to the men in Central Western districts of 22c., against 19½c. paid for the last two years. Due largely to the increase above announced and to the larger employment of men, it is estimated that \$15,000,000 more will be paid out in wages by the Steel Corporation in 1916 than in 1915. The last wage advance, effective Feb. 1, 1913, increased the wage account about \$12,000,000 a year.

At various independent steel plants notices were posted last week of advances in wages equal to those made by the Steel Corporation. In most cases these later advances were made effective Jan. 1 instead of Feb. 1. In addition to advances given by the Republic Iron & Steel Company, the Youngstown Iron & Steel Company and the Brier Hill Steel Company at Youngstown, as referred to in another column, press dispatches report similar announcements by the Jones & Laughlin Steel Company, Cambria Steel Company, Sharon Steel Hoop Company, the Pennsylvania Steel Company and the Harrisburg Pipe & Pipe Bending Company. It is known that like advances were made by a number of other independent steel companies, so that the new scale of wages becomes practically general. The merchant blast furnace companies have raised wages so that most of them are now paying the scale which prevailed on the last high mark for pig iron in 1912 and 1913, and in some cases that scale is now exceeded.

The United States Cast-Iron Pipe & Foundry Company, Scottdale, Pa., has given all employees receiving less than \$2.25 a day, an advance of 25c. per day. Other employees, it is stated, will receive an increase in wages on a percentage basis. A strike developed at this plant early last week, but was quickly ended by the above announcement.

A New Castle, Pa., dispatch says that a strike of laborers at the plant of the Standard Steel Car Company was settled Jan. 6, when the men voted to accept an increase in wages of 40c. a day.

Laclede Steel to Start Alton Works

The Laclede Steel Company, St. Louis, announces the appointment of Frank H. Johnson, district sales agent, 604 Continental & Commercial National Bank Building, Chicago, for the distribution of its products from its recently acquired works at Alton, Ill. This mill has been recently remodeled and comprises a thoroughly modern arrangement of open-hearth plant, blooming mill, billet mill and finishing mill. From its Alton works the company will specialize in open-hearth forging and rolling billets and fine quality strip steels. Operation of the Alton works is to begin this month. The general offices of the company continue in the Merchants' Laclede Building, St. Louis. Thomas R. Akin is president.

An Eastern Iron Ore Sale

The Thomas Iron Company, Easton, Pa., has contracted for the entire output of the iron mine of the Hoff Mining, Realty & Improvement Company, Wharton, N. J., for the next three years. The stock of ore on hand at the mine, amounting to about 5000 tons, has already been shipped to the furnace at Hokendauqua, Pa. Operations at the mine have just been resumed after two years of idleness.

Wharton Steel Company Properties to Be Acquired

The interests represented by Van Emburgh & Atterbury, New York bankers, who have been negotiating for a consolidation of Eastern blast furnaces, have exercised their option on the Wharton Steel Company properties in New Jersey. These have been in the hands of the Joseph Wharton executors and the latter named \$1,500,000 as their price to the promoters of the proposed consolidation. It is understood that 60 days may elapse under the terms of the option before the properties are transferred. Thus far the options taken on the Empire Steel & Iron Company and the Thomas Iron Company have not been exercised. They still have a few weeks to run. The Empire Steel & Iron Company price was about \$4,000,000 and the Thomas Iron Company option was given on a basis of \$55 a share for 50,000 shares. In the case of the Wharton properties it is stated that a considerable part of the proposed consideration is in bonds on the properties themselves, which include in addition to two large blast furnaces and one smaller one, the Hibernia mine near Wharton, N. J., and smaller mines in the same group, including the Allen-Teabo, Orchard, Scrub Oaks and Mount Pleasant—in all about 5000 acres of iron ore lands. The Hibernia, which is the largest mine, has reserves estimated at 4,000,000 to 5,000,000 tons of ore.

While no definite plans are announced by the banking interests which are to take over the Wharton furnaces and mines, there has been some discussion of by-product coke ovens and an open-hearth steel plant.

Steel Corporation's Gain in Orders Again Large

The monthly statement of the United States Steel Corporation shows that the unfilled orders on its books Dec. 31, 1915, were 7,806,220 tons, or a gain of 616,731 tons, the total on Nov. 30, 1915, having been 7,189,489 tons. The December increase is the fourth in size in the history of the company, the record increase being 1,042,874 tons in October, 1912, comparing with 1,024,037 tons in November, 1915, and 847,834 tons in October, 1915. The unfilled orders on Dec. 31, 1914, were 3,836,643 tons. The following table shows the unfilled tonnage for each month, beginning Dec. 31, 1912:

Dec. 31, 1915	7,806,220	May 31, 1914	3,998,160
Nov. 30, 1915	7,189,489	April 30, 1914	4,277,068
Oct. 31, 1915	6,165,452	March 31, 1914	4,653,825
Sept. 30, 1915	5,317,618	Feb. 28, 1914	5,026,440
Aug. 31, 1915	4,908,455	Jan. 31, 1914	4,615,898
July 31, 1915	4,928,540	Dec. 31, 1913	4,282,108
June 30, 1915	4,678,196	Nov. 30, 1913	4,396,847
May 31, 1915	4,264,598	Oct. 31, 1913	4,513,767
April 30, 1915	4,162,244	Sept. 30, 1913	5,003,758
March 31, 1915	4,255,749	Aug. 31, 1913	5,223,468
Feb. 28, 1915	4,345,374	July 31, 1913	5,399,356
Jan. 31, 1915	4,248,571	June 30, 1913	5,897,317
Dec. 31, 1914	3,836,643	May 31, 1913	6,324,322
Nov. 30, 1914	3,324,592	April 30, 1913	6,978,762
Oct. 31, 1914	3,461,097	March 31, 1913	7,468,556
Sept. 30, 1914	3,787,667	Feb. 28, 1913	7,656,711
Aug. 31, 1914	4,213,331	Jan. 31, 1913	7,827,365
July 31, 1914	4,158,589	Dec. 31, 1912	7,932,164
June 30, 1914	4,032,857		

Brier Hill Steel Company to Install Jobbing Mills

In addition to the 84 Koppers by-product coke ovens, contract for which the Brier Hill Steel Company recently placed with the H. Koppers Company, Pittsburgh, it has also decided to install four jobbing mills to be erected at its Brier Hill works at Niles, Ohio. Two of these will be light plate mills. H. C. Davis, who has been superintendent of the Thomas works at Niles, Ohio, for about 12 years, has been made superintendent of the Thomas and Brier Hill sheet mills at Niles. Frank P. Pyle, formerly superintendent of the Empire works, has been made superintendent of the four new jobbing mills to be erected.

Powdered aluminum and bronze are now being produced by a new department of Les Etablissements Grivolin, Toulouse, France. These products were formerly a monopoly of Germany.

Pittsburgh and Nearby Districts

The annual meeting of stockholders of the Central Steel Company will be held in its offices at Massillon, Ohio, on Thursday, Jan. 20, when a successor to John C. Neale, who resigned as president to become manager of sales of the Midvale Steel & Ordnance Company, will be elected. Other changes among officials are made necessary by the retirement of Mr. Neale. The company is running its plant to full capacity and is making good progress on the three open-hearth furnaces it is building.

The Pittsburgh Gear & Machine Company, Pittsburgh, has been incorporated with a capital of \$20,000 by Frank H. Rea, John Jackson and W. C. Rea. The company is building a new plant at Twenty-seventh and Smallman streets, Pittsburgh, for the manufacture of cut gears, and expects to have it in operation about March 1. Part of the equipment is yet to be bought.

About 250 laborers in the works of the Standard Steel Car Company, New Castle, Pa., went on strike, demanding \$2.25 for a 10-hour day instead of \$1.60. There is a good deal of unrest among laborers in manufacturing plants in the Mahoning and Shenango valleys, much of it due to exaggerated reports of profits being made by some of the companies on contracts for war materials.

The annual meeting of stockholders of the General Fireproofing Company, Youngstown, Ohio, will be held on Tuesday, Jan. 25, when the company may decide to manufacture metal sash and door frames. The chief engineer has recently taken out patents which will be used if the company decides to go into these lines.

At the monthly meeting of the structural section of the Engineers' Society of Western Pennsylvania, held in the Oliver Building, Pittsburgh, Jan. 3, James W. Rollins of Boston spoke on "The Relation Between Engineers and Contractors."

The Renshaw & Breece Engineering Corporation, Huntington, W. Va., has been chartered with a capital of \$5,000 and will carry on a general engineering business.

Owing to increased demand, especially in the stamping department, Hubbard & Co., Pittsburgh, have recently enlarged several buildings and installed additional equipment. They desire to buy a large punch and shear power press of about 500 tons' capacity, also for one or two inclinable power presses weighing 4000 to 8000 lb., an upright hammer 90 to 120 lb. capacity and a small electric hoist 500 to 1000 lb. capacity.

Referring to the additions to equipment to be made by the Wheeling Steel & Iron Company at Wheeling, W. Va., we are advised that the new bar mill being built by Mackintosh, Hemphill & Co., Pittsburgh, will have a capacity of 800 tons of skelp per day, or 800 tons of tin plate bars. The company expects to roll skelp on this mill wide enough to make pipe up to 8 in. in diameter. At present the company makes steel pipe in all sizes from $\frac{1}{2}$ in. to 12 in. in diameter, but has under contemplation the question of increasing its pipe capacity so that it will be able to produce pipe up to 16 in. in diameter.

The regular monthly meeting of the Association of Iron and Steel Electrical Engineers will be held in the Seventh Avenue Hotel, Pittsburgh, on Saturday evening, Jan. 15. Besides an address on an application of electricity to the iron and steel industry, President W. T. Snyder will talk on "The Association," defining its object, and considering ways and means of increasing its usefulness to the individual members by means of special committees and local meetings in different industrial centers. Association finances, publications and management will also be considered.

The Worth Brothers department of the Midvale Steel & Ordnance Company, Coatesville, Pa., has placed an order with the Wilson-Snyder Mfg. Company, Pittsburgh, for eight Wilson-Snyder horizontal duplex hydraulic pumps to be driven by eight 400-hp. geared Kerr steam turbines to furnish power for horizontal forging presses, the order for the turbines having been placed with the Kerr Turbine Company, Wellsville, N. Y.

This installation will be unique, in that the total reduction in speed between the turbine and the hydraulic pump is something like a ratio of 70 to 1. The turbines operate at 3600 r.p.m. and are connected to pumps by double-reduction gears of the herringbone type. This will probably be the largest installation of this type of hydraulic pump in the world.

Reports that the H. C. Frick Coke Company, Pittsburgh, being unable to make enough coke for the blast furnaces of the United States Steel Corporation, was buying in the open market, have been officially denied. The company owns about 2000 bee-hive coke ovens in the Pocahontas district in West Virginia, and some time ago started ovens in this district and recently started more. A good part of the coke being made in the Pocahontas region is shipped to the Illinois Steel Company, Chicago, and the Indiana Steel Company, Gary, Ind.

McKeefrey blast furnace of the McKeefrey Iron Company at Leetonia, Ohio, which has been idle for several years, was put in operation on Monday, Jan. 10. The stack has been practically rebuilt, chills have been installed and the furnace will make from 300 to 325 tons of chilled basic iron per day.

The Andrews & Hitchcock Iron Company, Youngstown, Ohio, blew in its No. 1 Hubbard furnace Dec. 28.

No. 1 furnace at Lorain, Ohio, of the National Tube Company, was blown in Dec. 31, making all the furnaces of this company in blast.

Valley Mold & Iron Company, Sharpsville, Pa., blew out its Alice furnace in December for repairs and expects to resume operations about Feb. 15.

The Railway & Industrial Engineering Company, Greensburg, Pa., manufacturer of switching and protective apparatus and out-door substations, has moved its sales office to the Peoples Bank Building, Pittsburgh. C. L. Hart is sales manager.

The Youngstown Radiator Company, Youngstown, Ohio, has been incorporated with a capital stock of \$25,000. The company will make radiators and may build a new plant.

Stockholders of the New Castle Rubber Company, New Castle, Pa., have voted to increase the capital stock from \$500,000 to \$1,000,000 and to issue bonds to the amount of \$300,000. It will make large additions to its works.

The Hultberg-Johnson Tool Company, Warren, Pa., has been incorporated with a capital stock of \$25,000 by C. J. Anderson, P. E. Johnson and J. E. Hultberg, 115 Pennsylvania Avenue, West Warren, Pa.

Car and Locomotive Orders in 1915

A revised summary in the *Railway Age Gazette* of Jan. 8, 1916, of the cars and locomotives ordered in 1915, which includes everything to Jan. 1, 1916, shows cars ordered to be 112,893 and locomotives, 1612. Of the cars, 109,792 were freight and 3101 passenger. Of the locomotives practically 50 per cent were ordered since Oct. 1, 1915, and the outlook for a continuation of this rate in 1916 is considered promising. Of those ordered last year, the greatest number were Mikados, of which there were 562, while Mallets ordered were 120 against 59 in 1914. The same authority states that a year ago the use of special steels and refined designing, in order to obtain the highest possible reciprocating and running parts, was confined to but a few roads. A great deal more attention has been paid to this in the past year, resulting in a considerable number of locomotives being built with a minimum weight in the parts comprising the driving gear and a corresponding increase in the dimensions of the boiler to provide additional steaming capacity.

The Kilby Locomotive & Machine Works, Anniston, Ala., has changed its name to Kilby Car & Foundry Company, so that it may better describe the line of manufacture conducted. There is no change in the management.

Edward Gatz and J. C. Gatz, Jr., who conduct the Empire Wire & Iron Works, Louisville, Ky., have filed individual petitions in bankruptcy.

British Restriction on Machine Tool Importations

Commercial Attaché A. H. Baldwin of the American Embassy at London, England, contributes the following to *Commerce Reports* under date of Dec. 11, 1915:

"The restriction on the importation of machine tools into Great Britain is a part of the general war control of manufactures, imports, and exports by the Government, and the primary impulse in the matter comes from the war munitions board, which controls many factories and in general has the power to make such restrictions as may seem necessary for the proper conduct of the war. Machine tools are so important that the board of trade has been requested to take charge of the issuance of licenses for the importation of these products (instead of the War Trade Department, which furnishes the licenses for export). In order to secure the importation of machine tools British importing houses, or manufacturers (as purchasers), must first obtain permission from the board of trade and must make certain agreements with respect to their disposal. Importers who desire to resell machine tools are restricted as to profits in such tools, and definite permission must also be obtained before any such machine tools can be exported. It is apparently not the intention to prevent such importation, but merely to control them in such a fashion that the interests of the Government may be served.

"It is evident that each specific request for permission to import must be handled at the discretion of the board of trade and the war munitions board. It is probable, also, that the war munitions board will give first call to controlled factories for any incoming machine tools that they may desire to take. With the war munitions board also lies the authority to designate the classes of machine tools which shall be subject to restrictions; and, while I was unable to obtain a statement in regard to this detail, it is apparent that the disposal of those tools which can be used in the manufacture of war material of any kind will be subject to such restriction by the authorities as may be deemed necessary."

National-Acme Purchase of Windsor Plant

The negotiations of the National-Acme Mfg. Company, Cleveland, Ohio, for the purchase of the Windsor Machine Company, Windsor, Vt., mention of which was made in THE IRON AGE Dec. 23, were concluded last week, and the Windsor plant has been turned over to the Cleveland company. The National-Acme Mfg. Company will continue to operate the Cleveland and Windsor plants as well as the one in Montreal, Ont., along the lines heretofore followed and with the view of expanding each as rapidly as conditions warrant. The shops at Windsor will probably be operated under the name of the Windsor plant of the National-Acme Mfg. Company. To provide funds for an extension at Cleveland about completed, for contemplated improvements at Montreal, and in part for the Windsor purchase, the National-Acme Mfg. Company proposes to increase its capital stock from \$2,500,000 to \$9,000,000. This will be voted on at a special stockholders' meeting called for Jan. 20, the date on which the annual meeting is held.

New Recording Instrument Company

The Bailey Meter Company has been incorporated under the laws of Massachusetts to manufacture and sell recording meters and instruments for power plant and similar uses. The meters have been developed during the past six years in the mechanical engineering department of the Fuel Testing Company of Boston. E. G. Bailey will devote his entire time to the new company, which is located at 141 Milk Street, Boston, Mass., but the Fuel Testing Company will continue its regular line of work under the personal direction of W. B. Calkins, who has been a partner with Mr. Bailey since its organization in 1909. The Bailey meters are adapted to measure steam, water, air and gases, and include orifice meters for all fluids in pipes; V-notch weir meters for open-flow liquids; boiler meters

showing steam output, rate of air supply and condition of fuel bed; gas flow meters for fan and ventilating ducts, and radiometers for averaging all kinds of chart records.

Peter A. Frasse & Co. to Build New Factory

With Peter A. Frasse & Co., Inc., 417-421 Canal Street, New York, the year 1916 marks one century in business. Some of the company's old ledgers, which are still in existence, show transactions with Aaron Burr, Alexander Hamilton and many of the other well-known earlier families of the city. In the little shop of the original Frasse was made the model engine for the steamboat invented by Robert Fulton.

This company is now about to enlarge its operations considerably. It has purchased a plot, 65 x 344 ft., close by the tracks of the Central New England Railway, in Hartford, Conn., on which a new mill and warehouse will be erected. Hartford was chosen as the location as it is considered the best point from which to serve the trade in western New England, and is also in direct communication with Pittsburgh and within easy reach of the company's warehouses in New York, Buffalo and Philadelphia. The building will be three stories and of either mill or concrete construction. In the heat-treating department, furnaces for annealing, heat treating, case hardening and tempering steels will be provided. Draw benches for cold drawing will be installed, and lathes for machining steel bars. The equipment will enable the company to deliver on short notice anything that a manufacturer might need in the way of raw material as well as semi-finished material in the various grades of steel of its manufacture.

Fire Engine Makers Agree on Open-Shop Plan

As the result of a recent strike at the shops of the American La France Fire Engine Company, Inc., Elmira, N. Y., a majority of the manufacturers of fire engines in the United States have entered an agreement to maintain the open shop in their plants, a move designed to combat unfair tactics on the part of labor unions and their central bodies throughout the country.

Since the strike at Elmira there have been intimations that political pressure would be brought to bear by certain unions, notably that of the machinists, to prevent municipal boards and councils from placing orders with makers of fire engines whose shops are not unionized. The plan adopted by the fire engine makers is similar to that devised by counsel for the American Anti-Boycott Association whereby competitive employers enter a protective contract, the basis of which is a pledge to operate open shops. If the union attempts to persuade a manufacturer to establish a closed shop in violation of such a contract, the other manufacturers who have subscribed thereto may secure an injunction. Further, if under such circumstances the agreement is violated, both the manufacturer and the union can be mulcted in damages, for the reason that the union is an intruder attacking property rights created by the contract. A contract to maintain open shops has been supported by the courts.

Several groups of manufacturers are now considering action similar to that of the fire engine makers.

The Harmony Club, whose membership is made up of the officers, sales force and heads of departments of the J. M. & L. A. Osborn Company, sheets and tin plates, Cleveland, Ohio, held its third annual meeting last week, running from Tuesday to Thursday. The program of the meeting covered business sessions interspersed with some entertainment, featured by addresses on topics connected with the business of the company.

The Steel Company of Canada, Canada Bolt & Nut Company Branch, Gananoque, Ontario, Canada, is installing additional equipment for the manufacture of bow sockets and drop forgings, which will enable its output in these lines to be doubled.

Machinery Markets and News of the Works

DOMESTIC DEMAND PRESSES

Less Buying by Munitions Manufacturers

Rearrangement of R. B. Phillips Contracts—Big Orders for Savage Arms Company—Railroads More Active Buyers

Builders of machine tools, all of whom have well-filled order books, have a big task on their hands in satisfying the steadily growing industrial demand. In the process, many buyers are certain to be disappointed, because they cannot get better deliveries than those offered, and many will be obliged to minimize their requirements until the problems of delivery become somewhat simplified. The heavy war buying is past, for the present at least, although munitions makers continue to buy small lots of machines.

In view of their sold-up condition and the ease with which additional orders can be secured some of the makers of machine tools have eliminated or reduced the commissions which they have heretofore paid to dealers not regularly representing them.

The demand in New York has been steady, and interspersed with many sales of small groups of machines have been a few involving large and varied lists of tools. An item of interest in the East is the placing of a contract by J. P. Morgan & Co. with the Savage Arms Company for 10,000 automatic field guns of a new type. They are for the British army and will cost \$7,500,000.

The American Ammunition Company has taken over the contract for shrapnel fuses valued at \$1,459,500, which was to have been executed by the Worcester branch of the R. B. Phillips Corporation. The contract will be completed in the shops of the Critchley Machine Screw Company, Worcester, which were purchased by the Phillips interests. It is further reported that a contract at the Lowell plant of the Phillips Corporation for 1,000,000 Russian detonators valued at \$2,600,000, will be executed by the International Steel & Ordnance Corporation, the work being done in the Phillips shops at Lowell.

The Midvale Steel & Ordnance Company has awarded the contract for a machine shop to cost \$120,000, at its Nicetown, Philadelphia, plant.

The Doehler Die Casting Company, Brooklyn, N. Y., has awarded the contract for the construction of a new factory at Toledo, Ohio. A foundry, machine shop and offices are included. The R. E. Dietz Company, New York, has purchased a five-story building for conversion into an addition to its plant.

The machine tool demand in Cleveland is largely confined to single tools and small lots, the railroads and steel plants doing some buying. The New York Central and the Southern Railway are in the market. Tools shipped from Cleveland to New York for export have been placed in storage, an unsatisfactory situation for the builders, inasmuch as they are not paid until the machines are placed aboard ship. It is noted in Cleveland that American electrical drills have displaced foreign makes.

Business in Detroit has been quieter, but is still good. Some notable expansion by automobile companies is taking place in Michigan. In Milwaukee inquiries are coming from any industries, largely with a view of ascertaining what deliveries can be made. The E. H. Wachs Company, Chicago, is building an addition to its plant to provide for the manufacture of a hand screw machine.

St. Louis reports that established companies are continuously in the market for equipment, many of them taking second-hand machines which command remarkable prices.

Business on the Pacific coast was heavier in December than is usual in that month, the call for heavy metal-working machinery being especially good as a result of the activity of the shipyards.

New York

NEW YORK, Jan. 12, 1916.

Inquiries and resultant sales are steady, but it is noticeable that there is practically none of the buying of large groups of tools so common a few months ago. Munitions makers continue to buy, but only to fill in, and their purchases now seldom exceed half a dozen machines at a time. The domestic demand is superior to that for export, and some good lots of equipment have been taken in the past few days. Large and varied lots of tools have been purchased by a new company which is to manufacture a calculating machine, and another good lot has been taken by a New Jersey company which is extending its facilities for manufacturing automobile piston rings. The West Side Foundry Company, Troy, N. Y., which is to make automobile air pumps, has been in the market. The General Electric Company is inquiring for some screw machines. Among the munitions manufacturers, the Driggs-Seabury Ordnance Company has been a purchaser.

It is stated that the Savage Arms Company, Utica, N. Y., which was recently acquired by the Driggs-Seabury Ordnance Company, has obtained through J. P. Morgan & Co., a contract for 10,000 light automatic field guns of a new design, to cost \$750 each, or \$7,500,000 for the entire quantity. They are for the British army. It is reported that the fiscal agents for Great Britain will advance the sum of \$1,875,000 to the arms company to facilitate manufacture and early deliveries. The gun is known as the Lewis automatic gun, and weighs but twenty-two pounds.

Arrangements are under way for the formation of a subsidiary of the Canadian Car & Foundry Company which is to take over its shell contracts. The new company is to be financed by the Russian Government, with a capital of \$10,000,000. The assets and liabilities of the parent company, under the first contract from the Russian Government calling for \$83,000,000 worth of shells, and all subsequent extensions of the values and amounts called for, will be assumed by the new company, the life of which is to run until the contracts have been fulfilled. All sub-contracts heretofore awarded by the parent company will be reassigned to those now holding them.

The Canadian Car & Foundry Company has Russian contracts for munitions aggregating \$154,000,000 in value. It sub-let a large amount of the work, and later found it burdensome to make payments on deliveries of parts, inasmuch as the Russian Government only pays for shells as they are completed. The bulk of an initial payment of \$20,000,000 paid to the Canadian company by the Russian Government was used in making advances to sub-contractors. The monthly shipments of the finished products are steadily increasing each month.

One result of the changed conditions in the machine tool field which have come about in recent months is the plan of at least one tool-building firm to eliminate all commissions to dealers, thus depending entirely on their own sales forces, unless dealers want to forego the commission which they have had heretofore. Other firms have reduced their commissions to dealers.

The Doehler Die Casting Company, Court and Ninth

streets, Brooklyn, N. Y., and Toledo, Ohio, has placed contracts for its new Toledo factory to contain 70,000 sq. ft. of floor space, consisting of a foundry, machine shops and offices, which are to be ready for occupancy May 1.

The Willys-Overland Company, Toledo, Ohio, has purchased the old Conrad Stein brewing property at 521-531 West Fifty-seventh Street, through to Fifty-eighth Street; and the intervening lot, and now controls a plot 150 x 200 ft. The buyer will build an eight-story service plant, at an estimated cost of \$300,000.

The Turner Construction Company, 11 Broadway, New York City, has been awarded contract by the American Paper Tube Company, Woonsocket, R. I., for the erection of a four-story factory, 55 x 166 ft., of reinforced concrete and brick, to be erected in the early spring. W. F. Fontaine, Woonsocket, R. I., is the architect.

The R. E. Dietz Company, lantern manufacturer, Greenwich and Laight streets, New York City, has purchased a five-story building, 25 x 101 ft., between Laight and Vestry streets. The site adjoins the buyer's present factory and will be converted into an addition to its factory. John E. Dietz is vice-president and general manager.

The Electro Dynamic Company, maker of interpole motors, will increase its plant at Bayonne, N. J., by a high one-story brick addition, with mezzanine galleries, 100 ft. square. The contract has been placed with the John W. Ferguson Company, Paterson, N. J.

The McLaughlin Company, Brockport, N. Y., has been incorporated with a capital stock of \$150,000 to manufacture hardware, metal and enameled ware, etc. It has purchased a factory. J. R. McLaughlin, J. F. Warner and Frank H. Falls, 336 State Street, Rochester, are the incorporators.

The Globe Malleable Iron & Steel Company, Syracuse, N. Y., has let contracts for additions to its plant, consisting of a die-sinking building, 80 x 90 ft.; a trimming press building, 40 x 60 ft.; a sand blast building, 40 x 60 ft., and a storage building, 80 x 90 ft., all one story.

B. Santeen, Jr., R. E. Santeen, Columbus, Ohio, and A. Gumble, Springfield, Ohio, have incorporated the Santeen Company, Utica, N. Y., capitalized at \$75,000 to manufacture household articles, etc.

The Endicott Forging & Mfg. Company, Endicott, N. Y., plans a one-story addition to its forging plant, of brick and steel construction, to cost about \$20,000.

The Rex Paint Company, Niagara Falls, N. Y., has been incorporated with \$50,000 capital by H. H. Schumacher, F. T. Findlay and W. Downing, Erie, Pa., to manufacture dyes, paints, etc.

The Unitube Auto Radiator Corporation, Rochester, has been incorporated with a capitalization of \$200,000 to manufacture automobile radiators, accessories, etc. C. S. Cook, Fairport, N. Y.; H. F. Beardslee, 340 Powers Building, and E. M. Sparlin, 1040 Granite Building, Rochester, are the incorporators.

The Gleason Works, manufacturer of gear generators, University Avenue, Rochester, has awarded contracts for the building of structural steel and concrete additions to its plant, including a foundry, 50 x 82 ft.; a machine shop, 50 x 98 ft., and a case-hardening building, 32 x 48 ft.

Incorporation papers have been filed by the Sarco Company, Esopus, N. Y., to manufacture steam traps, temperature regulators, engineering, railway and electrical supplies, etc. The capitalization is \$150,000. The incorporators are M. D. Israel, 201 West 107th Street, New York City; G. Huber, 1390 East Fifteenth Street, and G. E. Kimmerle, 1034 Forest Avenue, Brooklyn.

The Trigger-Lock Company, Niagara Falls, N. Y., will erect a three-story factory on Cherry Street, near Main Street, one floor of which it will equip for its own manufacturing uses.

The Buffalo Sled Company, Tonawanda, N. Y., is having plans prepared for an extensive addition to its factory to be built next spring at a cost of \$250,000.

The Contact Process Company, Buffalo, has let contract to the John W. Cowper Company, Fidelity Trust Building, for the erection of an addition to its plant at Abbott Road, Buffalo River and the Buffalo Creek Terminal Railroad to cost \$30,000.

The American Radiator Company, Buffalo, has let contract to the Durolithic Company for erection of brick and steel foundry addition to its Pierce plant at Elmdale Avenue and New York Central Railroad Belt Line to cost \$75,000.

The George Haiss Mfg. Company, manufacturer of coal-handling machinery, 141st Street and Rider Avenue, New York, has had plans drawn for a one-story brick factory, 34 x 100 ft., to be erected at Canal Place, near 141st Street, at a cost of about \$3,000.

New England

BOSTON, MASS., Jan. 10, 1916.

The Bullard Machine Tool Company, Bridgeport, Conn., has awarded a contract to the Turner Construction Company, 11 Broadway, New York, for the construction of a building, 50 x 268 ft., four stories. The first floor will be 28 ft. high and will have two craneways running its entire length. The second and third floors will be used as machine rooms and the top floor as offices and drafting rooms. It is planned to be completed May 1.

The plant of the Winsted Edge Tool Works, Winsted, Conn., was partially destroyed by fire, Jan. 6. The forge shop, 40 x 237 ft., was burned, but a brick fire wall saved the main building. About 100 hands were thrown out of work. Rebuilding will be rushed.

The Winchester Repeating Arms Company, New Haven, Conn., has taken out a permit for a machine shop, 54 x 449 ft., five stories, to be located on Shelton Avenue.

The Chase Metal Works, Waterbury, Conn., has secured a permit for a one-story brick and steel addition.

The new building planned as an extension of the plant of the Marlin Arms Company, New Haven, Conn., is 210 x 450 ft., one story. The contract has been awarded to James Stewart & Co., Inc., New York City.

The C. L. Judd Company, Wallingford, Conn., maker of brass goods, has announced a new working schedule whereby a 55-hr. week is put in force without reduction in wages from the former 60-hr. schedule.

The Scoville Mfg. Company, Waterbury, Conn., is erecting a generator building, 90 x 157 ft., two stories and gallery.

The Waterbury Mfg. Company, Waterbury, Conn., has awarded a contract for two additions, one 50 x 136 ft., one and two stories; the other, 39 x 90 ft., one story.

The Billings & Spencer Company, Hartford, Conn., has awarded a contract for a two-story building, 50 x 97 ft.

The Croxford Rim Tool Company, Malden, Mass., has been incorporated with capital stock of \$5,000. S. B. Croxford is president.

The Unit Railway Car Company, Watertown, Mass., has been organized with capital stock of \$54,000 by F. O. Stanley, president; Francis E. Stanley, treasurer; and E. M. Hallett.

The Worcester Nut Mfg. Company, Worcester, Mass., has been incorporated with a capital stock of \$100,000. Carl G. Tideman is president.

Plans are being prepared for an addition to the plant of the Putnam Light & Power Company, Mechanicsville, Conn., including a 1000-kw. turbine set, boiler, oil feed pump, heater and condenser.

The Atlas Steel Casting Company, Boston, Mass., has been incorporated with a capital stock of \$5,000. Edward L. Gleason is president.

The Bailey Meter Company, Boston, Mass., has been incorporated with a capital stock of \$350,000. E. M. Dodd, Jr. is president.

The Ayer Machine Tool Company, Ayer, Mass., has been incorporated with an authorized capital of \$50,000. A. N. Hunt is president and Edward A. Taft, 30 State Street, Boston, is treasurer.

The Commercial Machine Company, Boston, Mass., has been incorporated with an authorized capital of \$300,000. Ralph C. Piper is president.

The Standard Machinery Company, Worcester, Mass., has been incorporated with an authorized capital of \$150,000 by A. N. Whittemore, president; Clarence R. Streeter, treasurer, and C. J. Nyman.

The Worcester Machine Tool Company, Worcester, Mass., has been incorporated with authorized capital of \$25,000 by J. A. Barker, president; William P. Kerr, treasurer, and W. F. Kelley.

The Stamped Specialties Company, Boston, Mass., has been incorporated with a capital stock of \$10,000. J. E. Lankenau is president.

The Quigley Furnace & Foundry Company, Springfield, Mass., has awarded a contract for a foundry building, 91 x 208 ft.

Philadelphia

PHILADELPHIA, PA., Jan. 10, 1916.

William Young, Reading, Pa., has had plans drawn by William A. Fink, 426 Franklin Street, Reading, for the construction of a four-story brick and steel garage, 100 x 210 ft., to be erected for the Arcade Garage at a cost of about \$20,000.

Contract has been awarded to Barclay, White & Co., 1530 Chestnut Street, Philadelphia, for the construction of an addition to the machine shop of the Midvale Steel Company.

Nicetown, Philadelphia. It will be one and two stories, of brick, concrete and steel, 59 x 675 ft., to cost about \$120,000.

Simons & Arnold will erect a one-story brick garage, 100 x 120 ft., at Wayne Avenue and Louden Street, Philadelphia.

Weimer Machine Works Company, builder of blowing engines, blast furnace and steel works equipment, Lebanon, Pa., advises that the building operations necessitated by its recent fire are not interfering with the operation of its plant. The foundry and forge departments were not damaged, nor was the east half of its machine shop, which is now in operation. With the assistance of some local companies it is filling its orders as usual.

J. Alan Middleton, factory specialist and engineer, Widener Building, Philadelphia, is asking bids on 10 lathes, 24 in. swing, 10 ft. beds, new or second hand equipment.

The capacity of the Bennings steam power plant of the Potomac Electric Power Company, Washington, D. C., is to be increased by the installation of an additional 15,000-kw. generator. The building will be enlarged to accommodate the new machinery, and the contract for the construction has been placed with the J. G. White Engineering Corporation, 43 Exchange Place, New York.

Baltimore

BALTIMORE, Md., Jan. 10, 1916.

With \$320,000 capital stock the Baltimore Cold Storage Company has been organized. It is planned to secure a building and construct a large addition. James C. Leib, 210 Light Street, Baltimore, is president, and Lewis W. Davis, 6 East Camden Street, Baltimore, is secretary and treasurer.

The property formerly used by the Mergenthaler Linotype Company, Baltimore, has been sold. It comprises a one-story factory on the Baltimore & Ohio Railroad, 187 x 403 ft. The name of the purchaser has not been announced.

The Maryland Metal Crosstie Company, Havre de Grace, Md., has been incorporated with \$3,000,000 capital stock. Plans have not been announced. The incorporators are A. Freeborn Brown and Frederick W. Steiner, Havre de Grace, and Clarence C. Foreman, Munsey Building, Baltimore.

The Raymond Concrete Pile Company, Baltimore, has purchased a three-acre tract near Sparrows Point. No announcement of plans has been made.

The Comas Cigarette Machine Company, Salem, Va., is in the market for lathes and other machine tools.

Chicago

CHICAGO, ILL., Jan. 10, 1916.

The holiday week gave to the machinery trade but a brief respite from the driving conditions which have so long prevailed. January is scarcely under way and there is already a substantial resumption of inquiry. Purchases by the railroads in this territory are still limited to the few tools for shops here and there, but inquiry from manufacturers is still on the upward trend in point of volume. The inquiry of the Four Wheel Truck Company at Clintonville, Wis., has not yet been distributed; but it is expected to be among the most desirable of forthcoming business. The past few weeks have brought some interesting business from the Pacific coast, where there seems to be a revival in demand for fabricating machinery in particular. The congestion which is handicapping the eastward movement of machine tools has in some instances worked to the advantage of local customers; but on the other hand it is being found that delivery promises by tool builders have been in many cases too optimistic and expected machines are being delayed as much as thirty days.

Paul D. Goddard, formerly with the Illinois Tool Works, Chicago, has severed his connection with that interest and has located at Chicago and Orleans streets in the Knight-Light Building, to engage in the manufacture of tools and dies.

The Western Steel Car & Foundry Company, Chicago, is erecting a one-story steel forge shop, 71 x 602 ft., to cost \$37,500.

The National Pulley & Mfg. Company, Chicago, has been organized with a capital of \$100,000 by F. N. Kaufman, W. D. Bradfield and Albert H. Miller. W. D. Bradfield, 74 West Washington Street, should be addressed.

Davidson, Lockwood & Weiss, architects, 53 West Jackson Boulevard, Chicago, are receiving tenders for a foundry, 100 ft. square, one and two stories, to be erected at Clearing, Ill.

The Frost-Maker Ice Machine Company, Chicago, Ill., has been formed by E. P. Stroup, F. J. Irving and A. M. Turner and will have a capital of \$50,000.

The General Fire Extinguisher Company, the American Ever-Ready Roofing Company and the National Carbon Company are recent lessees of factory buildings to be erected in the central manufacturing district of Chicago. The architect of the buildings is S. Scott Joy.

The Fox Machine Company, Jackson, Mich., has begun the construction of a one-story machine shop, 90 x 312 ft., and a foundry, 90 x 120 ft., both of brick and steel.

The Aurora Foundry Company, Aurora, Ill., operated by Love Brothers, will be extended by the addition of a machine shop. Increased capacity is also being provided in the machine shop at the Love Brothers plant.

The Western Cartridge Company, Alton, Ill., has prepared plans for the building of a brass rolling mill and foundry. This will relieve the company of dependence upon outside purchases for considerable of its material.

The Northern Moline Plow Company, Moline, Ill., has been organized with a capital of \$50,000 by G. A. Stephens, F. G. Allen, C. A. Banister, G. H. Huntoon and L. C. Blanding.

The Bonner Drop Forge Tool Company, Champaign, Ill., has filed a petition for charter and is understood to have acquired the bondholders' interests in the plant of the Bonner Tool Company, recently sold at receiver's sale. It is the expectation that operation of the plant will be shortly resumed.

The Beloit Foundry Company, South Beloit, Ill., incorporated with a capital of \$10,000, has been organized by J. A. Janvrin, formerly with the Beloit Iron Works, Paul Halverson and others.

The Wilson & Bennett Mfg. Company, Clearing, Ill., manufacturer of gasoline tanks, is proceeding with the erection of the two-story addition to its plant, 100 x 200 ft., at a cost of \$50,000.

The E. H. Wachs Company, 141 West Grand Avenue, Chicago, Ill., is erecting an addition to its plant, 126 x 175 ft. It will be used for the manufacture of a new 1½-in. hand screw machine, and other products, which include engines, boilers and pumps, and will cost about \$35,000.

The American Power & Truck Company, Elgin, Ill., has made request for vacating a street to permit the extension of its plant.

The Russell, Burdsall & Ward Bolt & Nut Company, Rock Falls, Ill., is building an addition at its works.

The Harrison Machine Works, Belleville, Ill., of which Cyrus Thompson is president, is to be acquired from its present owners by a syndicate now being formed in St. Louis.

The Chicago, Burlington & Quincy Railroad has plans for the enlargement of its shops at Aurora, Ill.

The Ryan Car Company, Burnham, Ill., has taken out a permit covering the erection of a one-story steel car shop, 60 x 100 ft., to cost \$10,000.

The Simplex Truck Form Company, Chicago, has been organized with a capital of \$100,000 by Charles D. Norris, Walter E. Lund, Joseph Arose. The company may be addressed in care of the latter at 105 West Monroe Street.

The Central Brass Mfg. Company, Chicago, has been organized by J. Bunden, M. De Beer and H. J. Aaron, 76 West Monroe Street.

L. A. Ruda, Chicago, has had plans prepared for a one-story garage and machine shop, 42 x 125 ft., to be located on Kedzie Avenue, near West Twenty-third Street, to cost about \$18,000.

The Majestic Garage, Rockford, Ill., has been incorporated with a capital of \$2,400 by Peter Jacobson, G. L. Thew and J. A. Roose.

The Hamline Mfg. Company, St. Paul, Minn., has been organized by H. R. Miller with a capital of \$500,000 and will establish a plant for the manufacture of oxy-acetylene welding torches, bicycle attachments, etc.

The New Monarch Machine & Stamping Company, Des Moines, Iowa, will occupy a machine shop in which it will install tools to the amount of \$10,000. S. E. Anderson is president.

Indianapolis

INDIANAPOLIS, IND., Jan. 10, 1916.

Joseph C. Small, receiver of the Royer Wheel Company, Aurora, Ind., has sold the plant to Louis T. Moore of Cincinnati for \$60,150, two-thirds of the appraised value.

The Swayne-Robinson Company, Richmond, Ind., has let the contract for a foundry to cost \$10,000.

The Otalgia Toy Company, South Bend, Ind., has been incorporated with \$50,000 capital stock to manufacture toys and novelties. The directors are Clarence Sedwick, George A. Baker and B. C. Baker.

The Sterling Metal Mfg. Company has been incorporated

at Huntington, Ind., with \$25,000 capital stock to manufacture table knives and forks. Orlando Rex and John A. Fletcher, Chicago, are promoters.

The Orleans Water Company, Orleans, Ind., will build a waterworks system to cost \$150,000.

The Corwin Mfg. Company, LaFayette, Ind., has been incorporated with a capital of \$100,000 to manufacture telephone instruments and electrical devices. Elmer R. Corwin is president.

The Evansville Safety Appliance Company, Evansville, Ind., has been incorporated with \$50,000 capital stock to manufacture semaphores, crossing signals, etc. The directors are James P. Wilson, William M. Smith and William H. Redman.

The Hardy Mfg. Company has been incorporated at Pendleton, Ind., with \$25,000 capital stock to manufacture iron, steel and copper articles. The incorporators are Thomas M. Hardy, G. M. Hardy and Roscoe W. Hardy.

Maurice Goldberger, dealer in second-hand machinery, Fort Wayne, Ind., has filed a voluntary petition in bankruptcy, scheduling his liabilities at \$29,141 and assets at \$36,960.

Detroit

DETROIT, Jan. 10, 1916.

The volume of business in the past week has fallen off somewhat, but demand continues brisk enough to warrant the statement that conditions are satisfactory. From the general outlook dealers are inclined to look for a heavy business during the next two or three months.

The W. J. Burton Company, Detroit, has acquired a new plant through the purchase of the property of the Union Transfer & Storage Company, and in addition to using the present buildings, it will erect an additional factory. It manufactures metal ceilings and special iron work.

The Ross & Young Machine Company, Detroit, manufacturer of automobiles and parts, has increased its capital stock from \$35,000 to \$750,000.

The Scripps-Booth Company, Detroit, manufacturer of automobiles, has increased its capital stock from \$150,000 to \$350,000 to provide for its rapidly increasing business. Clarence H. Booth, formerly manager of the Studebaker plants, has been elected vice-president and managing director.

The Consolidated Car Company, Detroit, manufacturer of automobiles, has purchased the adjoining factory of Schweppé & Wilt. The building will add 100,000 sq. ft. to its present floor space.

The Reliance Engineering Company, Lansing, Mich., has increased its capital stock from \$250,000 to \$1,720,000.

The Gier & Dail Mfg. Company, Lansing, Mich., is planning on 100,000 sq. ft. floor space in its new plant, which it expects to have completed by June 1. It is now employing 150 men and will probably double its force when the buildings are finished. W. K. Pruden is president, W. H. Newbrough, vice-president, and B. S. Gier, secretary, treasurer and general manager.

The Russel Motor Axle Company, manufacturer of motor car axles, North Detroit, Mich., increased its capital stock from \$150,000 to \$250,000, not from \$50,000 as has been reported. This increase was made necessary by extensions to its plant and machinery, which, when completed in March, will approximate an outlay of \$75,000, made necessary by the growth in its business. Geo. B. Russel is secretary and treasurer.

The Reo Motor Car Company, Lansing, Mich., has increased its capital stock from \$4,000,000 to \$10,000,000, not from \$400,000 to \$1,000,000, as has been stated.

The Piston Ring Company, Muskegon, Mich., has made arrangements for the building of an addition to its plant which will double its capacity. The new construction is to include a machine shop, 125 x 180 ft., and a new foundry.

The Grand Trunk Railroad has acquired property 250 x 500 ft., at Flint, Mich., on which it will build a roundhouse and car shop, etc.

The Keeler Brass Works, Godfrey Avenue, Grand Rapids, Mich., has awarded a contract for an addition to its plant.

The Harrow Steel Spring Company, Kalamazoo, Mich., is planning extensions to cost \$80,000. A. W. Gregg is manager.

The Standard Oil Company of Indiana is working out plans preliminary to the building at Des Moines, Iowa, of a general supply station which will include machine shop.

George M. Studebaker, Jr., South Bend, Ind., has acquired a large interest in the Sibley Machine Tool Company, South Bend, manufacturer of lathes and other tools.

The Ward-Dickey Steel Company, Crown Point, Ind., has filed notice of a change of name to the Dickey Oil Engine Company.

Milwaukee

MILWAUKEE, Wis., Jan. 10, 1916.

Machine tool builders are facing a situation that has not been paralleled in several years, due to their heavy bookings which will require as long as ten to twelve months to fill, by reason of the many important plant extensions which are in prospect this year because of domestic demand. Inquiries are being put out quite generally by automobile, wood-working machinery, and farm implement makers, to determine at what time deliveries on possible purchases may be guaranteed. Good feeling prevails in every division of the metal-working trades.

The Berlin Machine Works, Beloit, Wis., manufacturer of wood-working machinery, is planning an addition to its plant in Beloit which will at least double the present capacity. It is said that tentative plans are being made for a shop, 80 x 300 ft., with sawtooth roof. P. B. Yates is president and general manager.

A garage and machine shop costing \$65,000 will be erected at Downer Avenue and Webster Place, Milwaukee, by the Neacy & Read Investment Company, Milwaukee. Plans by Martin Tullgren & Sons, architects, 13½ Second Street, call for a concrete, brick and steel structure, 120 x 176 ft., two and three stories, with part basement. Work will begin late in January.

The Pawling & Harnischfeger Company, Milwaukee, has been awarded the contract for installing a 5-ton electric traveling crane in the foundry of the Jaeschke Brothers Foundry Company, Milwaukee.

William A. Rupiper, DePere, Wis., has purchased the former plant of the Ripon Canning Company, DePere, and will remodel it for garage and machine shop purposes. A complete new equipment will be required.

The Electric Steel Casting Company, Milwaukee, organized recently, has purchased a site containing twenty acres between Main Street, the Northwestern Railway tracks, Sixty-second and Sixty-eighth avenues, in West Allis. The Rauf Company, 53 Patton Building, Milwaukee, is preparing plans for the foundry, of brick and steel, 80 x 300 ft., 32 ft. high. Work will start about Feb. 1. The equipment will include one 3-ton electric furnace. The company is capitalized at \$300,000. Temporary headquarters are at 720 Superior Street.

The Marshfield Iron Works, Marshfield, Wis., has booked an order for castings which will require overtime operations for at least six months. The order is for 10 tons of castings weekly and is said to be on account of a firm producing munitions of war. The force has been increased to meet the additional demand.

George Zagel, architect, 629 Walnut Street, Milwaukee, is in charge of the erection of a garage and repair shop to be erected on Twelfth Street, near Walnut, Milwaukee. It will be 46 x 140 ft., and cost \$10,000.

The National Concrete Machinery Company, 211 South Patterson Street, Madison, Wis., is increasing its capacity to meet the demand for its concrete fence-post machines from railroad companies and agriculturists. It is also manufacturing sheet steel molds for use in either power or manual fence-post production.

It is likely that Racine, Wis., will build a municipal garage and machine shop. The proposition has just been put to the Common Council by Mayor T. W. Thiesen.

The Northern Boiler & Structural Iron Works, Appleton, Wis., which is making large shipments of paper and pulp mill equipment, notably bisulphite towers, is contemplating either the enlargement of its plant, or its removal to larger quarters.

Edward Hoernel, hardware dealer, Racine, Wis., is planning to contract for a moderate production of a key-duplicating device.

The Federal Bridge Company, Waukesha, Wis., which has booked orders to construct gas tractors for both the Waite Tractor Company and the Neilson Farm Machine Company, Minneapolis, Minn., has closed a contract to manufacture 1200 machines for the Paramount Farm Tractor Company. Additional machinery will be required to handle the order.

The DuPont Powder Company, which has more than doubled the size of its plant at Barksdale, near Washburn, Wis., is to again enlarge it by the addition of eight buildings. F. T. Beers is superintendent.

The Newport Hydro Carbon Company, subsidiary of the Newport Mining Company, First National Bank Building, Milwaukee, is erecting three buildings at Carrollville for the production of intermediate chemicals used in the manufacture of dyestuffs. Two buildings are 50 x 150 ft., three stories, and the third is the power, light and heating plant. The investment will amount to \$100,000. E. C. Wilmer is secretary.

The Chain Belt Company, 736 Park Street, Milwaukee, has increased its capital stock from \$500,000 to \$1,000,000, to take care of its surplus and the general growth of the business. It is building a new core room and making other minor improvements. Orders on its books will require capacity operations for at least ten months. The officers are: President and general manager, C. W. LeValley; first vice-president and secretary, W. C. Sargent; second vice-president and superintendent, Donald Fraser; third vice-president, Frederick L. Slyer; treasurer, William C. Frye.

The Simmons Mfg. Company, Kenosha, Wis., has been re-incorporated under the name of the Simmons Company under the laws of the State of Delaware. The new capital stock is \$8,000,000. The formal transfer of the assets was effected Jan. 5. The home office will be at Dover, Del., but the plant and main offices will continue to be located at Kenosha. The personnel of the new corporation is as follows: President, Z. G. Simmons; vice-president and treasurer, A. H. Lance; second vice-president, George H. Milne; secretary, Alfred Terrell; assistant secretary, Morgan W. Price; directors, Messrs. Simmons, Lance, Milne, Terrell and Otto Rudd, Frank H. Truax, John F. Gail and Harry M. Vail. Messrs. Gail and Vail were added to the board on Jan. 5.

The Auto Parts Mfg. Company, 528-532 Broadway, Milwaukee, has been reorganized and new capital introduced. Walter N. Schwab takes the position of general manager; Charles W. Beckler, sales and advertising manager, and Frank B. Sykes, factory manager. The directors are: Burton L. Hibbard, William Lindsay, Elmer O. Ellsworth, Charles Thompson, H. Nauman, Thomas J. Pringle, James D. Millar and Paul D. Durant. The factory is being enlarged and facilities for manufacturing various automobile parts extended.

The Meyers Machine Company, Sheboygan, Wis., has filed notice of a change in its corporate charter to provide for a capitalization of \$50,000. It has taken over the plant and business of the Wisconsin Motor Truck Company, and has awarded contracts for the erection of a shop addition, 75 ft. square, to be used in the building of trucks. The company will continue the manufacture of wood-working machinery.

Cleveland

CLEVELAND, OHIO, Jan. 10, 1916.

The machine tool market continues active with demand confined mostly to single machines and small lots. Orders are well scattered, but requirements coming from the railroads and steel plants are more active. The New York Central Railroad has taken bids for machines for its Lake Shore shops, in addition to the list issued early in December, making in all about 16 machines. Corrigan, McKinney & Co. has placed orders for a number of small tools for its steel plant machine shop, the heavier equipment for which was placed several months ago. Many machine tools for export from Cleveland have been placed in storage because of railroad embargoes to the seaboard, and some machines shipped from this city for export last October have not been located, being tied up somewhere in railroad yards. This is an unsatisfactory situation for machine tool builders as they cannot secure payment for export machinery until delivered on shipboard. In spite of embargoes some machinery, consigned to another port rather than to New York City, has gone through within the past two weeks with fairly satisfactory promptness.

The demand for cranes is very good and comes from scattered sources. Some foreign orders for locomotive cranes, particularly from Russia, have been received. A heavy demand exists for portable electric drills, both from domestic sources and for export. American makers of electric drills are now supplying the world, outside of some of the warring nations. Before the war a large part of this foreign trade was in the hands of German manufacturers, with whom American makers were generally unable to compete in prices.

The Southern Railway, through C. R. Craig, purchasing agent, Washington, D. C., has issued the following machinery list, bids on which will be received Jan. 17. Motor drive is specified for the machines in the list:

One two-wheel dry grinding machine with 3 x 24-in. wheels.
One plate furnace, 6 x 8 ft. inside.
One 60-in. radial drill press.
One straightening roll to handle 5/16-in. flats.
One bending and straightening machine.
One 36-in. cold sawing machine.
One portable rivet furnace.
Two portable oil-burning rivet forges.
Three portable torches.
One horizontal punch to punch 1-in. hole in 3/4-in. plate.
One double-head bolt cutter, capacity 1/2 in., with dies.
One 2-in. double-head bolt cutter, capacity 2 in., with dies.

The B. M. Gardner Company, Cleveland, has been incorporated with a capital stock of \$10,000 to manufacture metal products and will act as selling agent for Worth Brothers' plates and other steel products. C. E. Conover, formerly connected with the Whyte Company, Cleveland, is secretary.

The H. J. Walker Machine Shop & Foundry Company, Cleveland, has been incorporated with a capital stock of \$25,000. It is establishing a plant on East 131st Street, and it is understood will do machine work for the Chandler Motor Company, nearby.

The Federal Gear Company, which recently established a plant at 1407 East Forty-fifth Street, Cleveland, is engaged in automobile work, but in the next few months expects to manufacture gears.

The Triple Die & Tool Company, Cleveland, has been incorporated with a capital stock of \$10,000 by B. F. Mallory, T. A. Schmalz, and others.

The Globe Machine Stamping Company, Cleveland, is enlarging its plant by the addition of a second story, 100 x 165 ft., to its tool box department and has acquired several adjoining lots to provide space for a railroad site and additional buildings.

The Coiled Wire Products Company, Toledo, Ohio, has been incorporated with a capital stock of \$50,000 by W. J. Cavanaugh, H. C. Tillotson, George A. Spencer, and others. It is located on Dorr Street, and will manufacture automobile seat springs and other coiled wire products.

The Abner Mfg. Company, Wapakoneta, Ohio, has been incorporated with a capital stock of \$25,000 by J. H. Goeke, R. B. Anderson, and others, to manufacture tools, gas generators, light fixtures, water fixtures, etc.

The Buckeye Twist Drill Company, Alliance, Ohio, will double the capacity of its plant by the erection of an addition 60 x 90 ft.

The Carbo Steel Post Company, Marion, Ohio, will build a plant for the manufacture of steel telephone poles. It will be located near the new plant of the Interstate Iron & Steel Company.

The General Ozone Company of America, Akron, Ohio, will establish a plant to manufacture equipment for electrically purifying water. It has an office at present with the Neel-Armstrong Company, 257 East Market Street. R. M. Leggett is manager.

The Wright Mfg. Company, Lisbon, Ohio, maker of chain hoists, is enlarging its plant by the erection of an addition, 30 x 75 ft.

The Seneca Wire & Mfg. Company, Fostoria, Ohio, has completed plans for a two-story and basement storeroom, a one-story cleaning and coarse wire department, 100 x 150 ft., and an addition to the main building, all to cost about \$100,000.

Cincinnati

CINCINNATI, OHIO, Jan. 10, 1916.

Local labor troubles are simmering down, and only a few machine shops are now affected. To show how fast the situation is being adjusted, the American Tool Works Company has on its payrolls to-day 890 men, which would be above the average in normal times. Other large plants also report full forces.

The labor situation at Hamilton continues troublesome, although steady gains have been made in the number of men returning to work. During the past few days the Hamilton Foundry & Machine Company, the Peerless Foundry Company, and others, have re-opened their shops, and are operating with reduced forces. Several clashes have occurred lately between the working men and the strikers, but no further trouble is anticipated, as the authorities appear to have the situation well in hand.

The annual report of the building commissioners of the city of Cincinnati, Ohio, gives the estimated valuation for improvements of different metal manufacturing plants, as follows:

R. K. LeBlond Machine Tool Co.	\$14,000
National Lead Company	45,000
The O. Armleder Company	15,000
Modern Foundry Company	10,000
Cincinnati Milling Machine Company	15,000
The Pollak Steel Company	10,000
The Joseph Joseph & Bros. Company	14,000
Cincinnati Ball Crank Company	14,000
The Huenfeld Company	130,000
Hess Spring & Axle Company	45,000

A number of tentative building plans for additions to local plants are under way, but it is stated that the scarcity of structural steel is holding up two or three projects. Among additions recently completed is one to the Cincinnati

Milling Machine Company's factory at Oakley, equipment for which is now being installed.

The total estimate for building improvements of all kinds for 1915 is \$14,025,333, which is a decided improvement over 1914, that only held a record of \$8,820,446.

The John A. Oberhelmann Foundry Company, Cincinnati, expects to have its new foundry on Colerain Avenue in operation before the close of the month.

The Queen City Engineering & Machine Company, Cincinnati, has acquired the plant of the Hickory Carriage Company, in West End, and is fitting it up for the manufacture of lathes. New equipment is being installed.

The addition to the plant of the Miami Brass & Foundry Company, Dayton, Ohio, will be of brick, 40 x 105 ft., one story. Little new equipment will be needed as the building is intended mostly for storage purposes.

Work will commence at an early date on the power plant planned by the Dayton Light & Power Company, Dayton, Ohio, estimated to cost \$1,000,000, including the equipment. It is expected to be completed before Nov. 1.

The Efficient Tool Company, Springfield, Ohio, has been incorporated with \$25,000 capital stock by C. M. Stretcher and others. Manufacturing plans are not yet available.

Plans have been completed for the addition to the plant of the Robbins & Myers Company, Springfield, Ohio, estimated to cost \$150,000. It will be ready for installation of the machinery before next summer.

The Shaw Wire Fence Company, Columbus, Ohio, whose building plans were recently held up, has decided to go ahead with the erection of a plant on Reynolds Avenue.

The Central Ohio Paper Company, Columbus, Ohio, will soon advertise for bids on a five-story brick and steel structure, estimated to cost \$225,000.

The Summit Grave Vault Company, Columbus, Ohio, has been organized to establish a plant at Columbus. Building details are not yet available.

The National Artificial Refrigerator Company, Wapakoneta, Ohio, will build a plant. Arthur Geisler is president.

The Abner Mfg. Company, Wapakoneta, Ohio, has been incorporated with \$25,000 capital stock by R. B. Anderson and others. It will manufacture water filters, gas generators, etc.

The Troy Mfg. Company, Troy, Ohio, manufacturer of automobile bodies, had a small fire loss last week. No delay in shipments will result.

The Central South

LOUISVILLE, KY., Jan. 10, 1916.

Reports from machinery men continue favorable, and with Southern trade conditions better than for a long time, prospects are bright. New industries are being established in greater number, a feature of the situation being that a large proportion of these are iron-working establishments. The demand for power equipment remains strong, and electrical concerns are also selling a larger number of motors, as well as generating machinery.

J. W. Galvin is building an automobile garage at 648 Center Street, Louisville.

The Louisville & Jeffersonville Ferry Company, Louisville, will build an all-steel steamboat.

The Sandy Valley Light & Power Company will build a power plant at Louisa, Ky. L. L. Stone is manager.

S. B. Anderson, Memphis, Tenn., and G. L. Drury, Morganfield, Ky., are planning the construction of an electric railway from Morganfield to Uniontown, Ky.

The Watts Mfg. Company, Paducah, Ky., has been incorporated with \$25,000 capital stock to manufacture a hardware specialty.

The Columbia Lighting Company, Columbia, Ky., will install a crude oil engine with a capacity of 50 hp.

The Commercial Electric & Power Company, Seymour, Ind., is being organized and will install an electric light plant.

The Cookeville Veneering Company, Cookeville, Tenn., has taken over the plant of the Nashville Egg Case Filler Company, Nashville, Tenn., and will enlarge it.

J. I. Watson and W. W. Manker, Chicago, are planning the establishment of a tannic acid plant at Oneida, Tenn. Tank cars will be purchased as part of the equipment.

The Knoxville Lumber & Mfg. Company, Knoxville, Tenn., has purchased the plant of the S. B. Edgar Lumber Company, Jefferson City, Tenn., and will enlarge it.

W. H. Sudbury, Friendship, Tenn., has purchased the local electric light plant from R. T. Coffman.

The Chattanooga, Tenn., Chemical Company has been organized to equip a plant for the manufacture of carbolic acid. It will spend \$150,000 for machinery. The Converse Bridge Company, Chattanooga, has the contract for erecting the structural iron.

Harrison Brothers & Co., Philadelphia, has announced that a factory will be erected at Chattanooga, Tenn., for the manufacture of sulphate of aluminum and other products. The cost of the plant will be about \$100,000. H. W. Sparks will be the manager. A production of 30,000 tons a year is planned.

The Tennessee Water Company, Nashville, Tenn., has been organized with \$600,000 capital stock by George B. Adams, J. L. Foust, and others, to develop water-power properties. No definite plans have been announced.

The People's Ice & Coal Company, Paris, Tenn., will erect a new ice factory, doubling the capacity of its plant. Ice machinery to make 750 tons a day will be installed. A cold-storage plant will also be built. J. W. Lewis is president.

Electrical machinery will be installed by the Union Mining Company, Frostburg, Md.

The Mount Savage Fire Brick Company, Mount Savage, Md., is planning to install electrical machinery.

The Staunton Brick Company, Staunton, Va., will equip its plant for a daily output of 25,000 bricks.

The Phoenix Hardening Equipment Company, Cleveland, has been incorporated with a capital stock of \$15,000 by N. D. Radabaugh, C. A. Burr and others.

St. Louis

ST. LOUIS, MO., Jan. 10, 1916.

Pressure for equipment and difficulty in obtaining it are apparently as great as ever. The tendency toward the establishment of new enterprises is more marked. Established companies are continuously in the market for additional equipment. Second-hand tools continue to command remarkable prices. The outlook for the year is regarded as bright. Collections are good and investment funds are more easily obtainable.

The St. Louis Brass Mfg. Company, St. Louis, Mo., has begun the erection of an addition which will double its capacity. The new equipment will include sherardizing apparatus.

The Chevrolet Motor Company of St. Louis, St. Louis, Mo., has increased its capital stock from \$10,000 to \$1,000,000 and will enlarge the plant it has acquired from the Banner Buggy Company.

The Carr-Trombley Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by A. B. Trombley, Eugene H. Angert and J. C. Jones, Jr., of St. Louis, and J. T. Adams and J. T. Carr of Dubuque, Iowa, and will equip a lumber plant.

The Standard Pencil Company, St. Louis, Mo., has increased its capital stock from \$3,000 to \$30,000 and will enlarge its factory capacity.

The A. & W. Motor Company, Joplin, Mo., has been incorporated with a capital stock of \$12,000 by Clyde H. Miller, J. S. Allington and V. A. Wilber.

The Kansas City Light & Power Company, Kansas City, Mo., has been incorporated with a preliminary capital of \$2,000, to be enlarged later, by Frank Hagerman, Clyde Taylor and E. E. Ball, and will equip and operate electric and heating plants.

The St. Joseph Artesian Ice & Cold Storage Company, St. Joseph, Mo., has been incorporated with a capital stock of \$500,000 by C. H. Taylor, A. D. Cole and George C. Tolman to manufacture ice and do a cold-storage business.

The King Foundry Company, St. Joseph, Mo., has increased its capital stock from \$40,000 to \$65,000 and will install additional equipment.

The Moberly Packing Company, Moberly, Mo., has been incorporated with a capital stock of \$20,000 by L. W. Ficklin, I. L. Tugge and Frank J. Overberg.

The electric light plant improvements for New Madrid, Mo., to cost \$15,000, will include one 100-kw. alternating current generator, operated by one 125-hp. oil engine, also one 50-kw. alternating current generator operated by a steam engine.

It is reported that L. A. Sherman, Kansas City, Mo., vice-president of the Sportsmen's Cartridge Company, will equip a plant for the manufacture of shrapnel and cartridges.

The Federal Fruit & Cold Storage Company, Whitney Central Bank Building, New Orleans, La., will equip a series of cold storage plants. James L. Wright is president.

The Schram Glass Manufacturing Company, Wright Building, St. Louis, Mo., will increase its capital stock from \$500,000 to \$750,000 and add to its capacity.

The Western Cartridge Company, Alton, Ill., will equip for the manufacture of sheet brass for use in its plant.

The Lansing Wheelbarrow Company, Lansing, Mich., has acquired about 8000 acres of timber land near Bruin, Ark., where it will equip wood-working plants.

The Newark Canning Company, Newark, Ark., W. A. Isgrigg, secretary, will equip an isolated electric light plant of about 500 lamp capacity; also a 15-ton ice-making plant.

The Green Motor Car Company, Little Rock, Ark., has been incorporated with a capital stock of \$10,000 by A. B. Cox, C. E. Shoemaker and J. W. Green.

Dardanelle, Ark., will expend about \$20,000 on its water-works, adding two centrifugal pumps and other equipment. W. P. Halliday, McAlester, Okla., is engineer, in charge.

The Heber Springs Light Company, Heber Springs, Ark., will install two units of 120 and 60-kw. respectively, one 125-hp. boiler, pump, engine, etc.

The Piggott Handle Company, Piggott, Ark., has been incorporated with a capital stock of \$10,000 by J. O. C. L. and R. P. Sallee.

The Baughman Cabinet Shop, Pine Bluff, Ark., has been incorporated with a capital stock of \$15,000 by Phil Woller- man, Ross and M. F. Baughman.

The Osage Iron & Steel Company, P. O. Box 127, Sand Springs, Okla., is reported in the market for electric motors.

The Correct Change Making Company, Shawnee, Okla., has been incorporated with a capital stock of \$10,000 by W. J. Barnett, F. P. Ferttinger, Fred Lewis, and others.

Camille & Kalisto Salon, Lafayette, La., will equip a machine shop and automobile repair plant to cost about \$5,000.

Birmingham

BIRMINGHAM, ALA., Jan. 10, 1916.

The holidays had little effect on the wholesale machinery market, business progressing to higher levels persistently. The call for wood-working machinery has become stronger. The all-around demand is excellent. Machine tools cannot begin to be supplied in the quantity and with the dispatch desired. The year has opened with good prospects.

The McCabe Chemical Company, Charleston, S. C., has leased the plant of the Interstate Chemical Company, Macon, Ga., and will use it for the manufacture of sulphuric acid. Improvements costing \$100,000 are reported as contemplated.

The Pine Burr Lumber Company, Jacksonville, Fla., has been incorporated with a capital stock of \$200,000 by Bascom Parker, Niles, Mich., and others.

Dorming-Price Lumber Company, Brunswick, Ga., has purchased 6000 acres near Thalmann and will commence operations at once.

The Globe Machinery & Barrel Factory, Savannah, Ga., has been incorporated with a capital stock of \$50,000 to manufacture barrels, etc. W. W. Keller and Gordon Saussey, Savannah, and Eastern associates, are stockholders.

The Dixie Metal Products Company, Jacksonville, Fla., organized with a capital stock of \$10,000, will manufacture stoves. Mark G. Roy and others are in charge.

Thomas G. Purse, Savannah, Ga., it is reported, can give information regarding a project to establish a meat-packing plant to cost \$250,000.

The Standard Four Jry Company, Anniston, Ala., is asking for prices on two power drill presses, 28 to 32 in. Second-hand machines, if in good condition, will be considered.

Texas

AUSTIN, TEX., Jan. 10, 1916.

The Texas Southern Electric Company will install new pumps and other equipment in its waterworks plant at Beeville, and an engine and generator in its electric light plant. F. C. Greer is local manager.

The municipal waterworks plant at Temple will be equipped with an electrically operated air pump.

The Texas Southern Electric Company has purchased the electric light and ice plants of the Pittman Ice, Light & Electric Company, Center, and will install new machinery and enlarge the plants.

The City Council, Wolfe City, will enlarge the municipal waterworks plant.

A. N. Deering and associates, Waco, plan to build a cotton-seed oil mill at Plainview, to cost about \$75,000.

The Texas City Handle Company, Texas City, has been organized with a capital stock of \$30,000 to manufacture handles. Hugh B. Moore is one of the incorporators.

The Llano Irrigation Company, Questa, N. M., will install an irrigation pumping plant near that place.

Abe Steiner and associates have purchased the electric light and power plant at Columbus, Tex., and will install new machinery.

Sam Hamburger, Columbus, and associates, plan to build an ice factory.

The Stone & Webster Engineering Corporation, Boston, Mass., which obtained a franchise for building an interurban electric railway into Terrell some time ago, will begin the construction work soon, it is announced. The road is to run from Dallas to Terrell, a distance of about thirty miles.

The Willys-Overland Company, Toledo, Ohio, will build an automobile service plant at Dallas.

Tyler voted \$250,000 in bonds for the construction of a municipal waterworks plant.

The Pacific Northwest

SEATTLE, Jan. 4, 1916.

The usual holiday closed season in the logging camps has been shortened from six weeks, the usual close-down in some cases, to only two or three days, due to the extreme shortage in logs. The lumber market in the Pacific Northwest is healthier at this time than for several years past. There is a definite report prevalent that railroads are about to resume heavy timber buying.

Wright Truck Attachment Company, Seattle, has been incorporated by W. W. Wright and R. W. Scott, with \$50,000 capital stock.

The McGhie Trading Company, Grangeville, Idaho, has purchased the local brewing plant and will convert it into a cold storage plant.

The Hawley Pulp & Paper Company, Oregon City, Ore., is erecting a new mill to cost about \$500,000.

The Parker Match Company, Steilacoom, Wash., will double the capacity of its plant early in 1916.

The Modern Threshing Cylinder Company, Spokane, Wash., has been incorporated for \$1,000,000 by Orphus C. Shaw, Thomas Hodgin, C. Christopherson, Oren H. Henry and William G. Mauser.

The Alaska Lumber & Box Company, Hadley, Alaska, whose plant was destroyed by fire, announces that it will rebuild in the spring, with capacity greatly increased.

The Tacoma Smelter, Tacoma, Wash., owned by the American Smelting & Refining Company, New York, will be improved at an expense of \$100,000.

San Francisco

SAN FRANCISCO, Jan. 4, 1916.

While a good many buyers kept out of the market during the holiday period, the volume of sales in the latter part of December was much larger than usual for that time of year. Heavy metal-working machinery was especially active, with a number of large orders for summer delivery, notwithstanding the high prices asked. The largest buyers have been ship-builders; practically all of them on the Pacific coast, the larger companies having bought rather heavily. Recent sales include several large electric cranes. Railroad shops in this vicinity have not bought much, but at least one substantial railroad order has come from the mountain district. Inquiries are also coming more freely from shops engaged on miscellaneous work, whose requirements are now rapidly increasing. Logging and mill equipment also receive more attention. In other lines there is no especially conspicuous feature, but the demand for general factory equipment is growing much stronger.

It is announced that the Axelson Machine Company, 1406 San Fernando Street, Los Angeles, has started the manufacture of engine lathes.

Among foreign buyers recently in San Francisco were E. P. Houghton of Sydney, Australia, who has been placing orders for implements, and Knud Jensen, buyer for an electrical equipment house of Buenos Aires.

The local office of the American Brake Shoe & Foundry Company has been moved from the Monadnock Building to the new Call Building. The representation has been taken over by Thomas Finigan, formerly vice-president of Pierson, Roeding & Co.

The Fernholtz Machinery Company has been incorporated at Los Angeles with a capital stock of \$50,000, by C. W., E. A. and F. W. Fernholtz and F. D. McClure.

The United Engineering Works, San Francisco, is introducing a new type of semi-Diesel marine engine.

The California Shipbuilding Company, incorporated in Maine with a capital stock of \$5,000,000, has filed copies of

its articles in this State. It has just closed a deal to take over the Craig plant at Long Beach, Cal. R. M. H. Robinson is manager.

The Hanlon Drydock & Shipbuilding Company, Oakland, is going ahead with its new shipyard, and will equip a machine shop. The new drydock will handle vessels up to 4000 tons.

P. Swanson is moving his boat-building establishment from Belvedere to Oakland, Cal.

The American Woodworking Machinery Company is moving its local office from 41 Fremont Street to 525 Market Street, placing the stock in a warehouse.

The Western Laundry Machine Company, which was located at 41 Fremont Street, has moved to larger quarters at 416-418 Mission Street.

The Pacific Canning Machinery Company is starting a factory at Long Branch, Cal. The company is headed by A. C. Greene, J. E. Frymyer and W. E. Privett.

The Union Ice Company, co-operating with the Redlands Fruit Association, is preparing to build a fruit precooling plant at Redlands, Cal.

It is announced that the Goldy Machine Works, Sunnyvale, Cal., has been sold to R. P. Matches, to be used in connection with a chain of taxicab systems. The shop is said to have cost originally over \$200,000.

Canada

TORONTO, Jan. 8, 1916.

The William Kennedy & Sons, Ltd., Owen Sound, Ont., has taken over the plant of the Northern Iron & Steel Company at Collingwood, Ont., and will at once make alterations and install new machinery. The work will take about two months to complete. This company recently received a large order for shell billets.

The Cadwell Sand & Gravel Company, Ltd., Sandwich, Ont., will build a large factory there to cost \$50,000.

The Dominion Steel Foundry Company, Hamilton, Ont., will erect four buildings at its plant.

The Ontario People's Salt & Soda Company, Kincardine, Ont., will spend between \$10,000 and \$15,000 on extensions and improvements. J. Tolmie is manager.

The Hardware Specialties, Ltd., Pembroke, Ont., will build a factory there.

Bids will shortly be called for the construction of terminals at Vancouver, B. C., for the Great Northern Railway Company. Fred L. Townley is the architect.

Cornwall, Ont., will build an addition to its pumping station and waterworks plant, to cost \$25,000. J. G. Harkness is clerk.

Newcastle, N. B., will purchase a new electric pump for its waterworks plant. D. A. Jackson is engineer.

The Goldie & McCulloch Company, Ltd., Traders Bank Building, Toronto, is in the market for a 25 to 50-kw., 250-volt direct-current generator, direct-connected with engine.

Calgary, Alberta, will construct a waterworks plant and system to cost \$3,000,000. Plans are being prepared by G. W. Craig, city engineer.

A new pumping station will be constructed at North Vancouver, B. C. A. M. West is the engineer.

The plant of the Weeden Chemical Company, Weeden, Que., which was destroyed by fire with a loss of \$10,000, will be built.

A. J. Bates of the McConkey-Bates Company, Stratford, Ont., is planning a factory for the manufacture of vaults of corrugated iron. It will be located in the Corrugated Pipe Company's building.

The W. G. Edwards Company, Ltd., Bridgeburg, Ont., has been incorporated with a capital stock of \$40,000 by William G. Edwards, Frank E. Jackson, Ward R. Krafft, and others, to manufacture machinery, vehicles, etc.

The Precision Mfg. Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of \$60,000 by Arthur W. Varey, Roswell L. Smith, Joseph B. McAndrew, and others, to manufacture machinery, tools, etc.

The Inter-Ocean Auto Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Joseph A. Perrault, Joseph G. F. Paquin, and others, to manufacture automobiles, aeroplanes, etc.

The Motor Trucks, Ltd., Brantford, Ont., has been incorporated with a capital stock of \$500,000 by James Harley, Edmund Sweet, A. M. Harley, and others, to manufacture automobiles, motor trucks, etc.

The Arionola Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by Henry A. Hall, Louis F. Beck, 93 Conduit Street; Joseph J. Flint, and others, of Toronto, to manufacture pianos, musical instruments, etc.

NEW TRADE PUBLICATIONS

Calendar.—S. A. Machinery & Supply Company, San Antonio, Tex. Calendar hanger. Size, 23 x 26 in. The upper part of the hanger is given over to a birdseye view of the plant of the company, while the calendar occupying the remainder of the hanger is of the three-months type with the dates for the current month and the holidays printed in contrasting colors.

Steel Tanks.—Hammond Iron Works, Warren, Pa. Calendar hanger measuring 17 x 29 in. With the exception of a small reproduction of the company's trademark on the hanger, the calendar is free from advertising of any nature. The trademark is, however, sufficient, by reason of its form, to call attention to the line of steel tanks for refineries, mines, cyanide plants, railroads and industrial plants and storage purposes and general steel plate construction fabricated. The pad contains large figures in white on a contrasting background.

Pipe Threading and Cutting Machine.—Landis Machine Company, Waynesboro, Pa. Circular. Pertains to a 4-in. pipe threading and cutting machine equipped with patented die heads which was illustrated in *THE IRON AGE*, Aug. 5, 1915. The description of the machine is supplemented by engravings of the machine itself, the die head and the chasers. The distinctive features of the design and the points of excellence of the machine are commented upon and a table of specifications and list of equipment furnished are included.

Gears.—Boston Gear Works, Norfolk Downs, Mass. Catalog E9, superseding all previous issues. Refers to a line of spur, bevel and worm gears that are made in cast iron, brass and steel, sprockets and chains, thrust collar bearings and hobs. Illustrations of the various gears are given with tables of the sizes that can be supplied and the same arrangement is followed for the chains and bearings. A brief description of the factory and a few points regarding the materials used are included, together with a number of tables of useful information.

Demand Indicators.—Fort Wayne Electric Works of the General Electric Company, Fort Wayne, Ind. Two bulletins. The first, No. 46,102, illustrates and describes a type of demand indicator to measure the amount of current drawn from the supply mains. The way in which the maximum demand is indicated by the use of thermostatic springs in connection with an arrangement for holding the pointer at the point of maximum demand is touched upon and dimension and wiring diagrams are included. The other bulletin, No. 46,103, tells of the advantages of using a type of demand indicator in which a timing mechanism is provided for use where it is desired to indicate the demand for a definite interval of time. A description of the indicator is supplemented by a number of views of various parts and wiring diagrams and specification tables are included.

Metal Cutting Saws.—United Engineering & Foundry Company, Pittsburgh, Pa. Bulletin S. Mentions a line of hot and cold saws for the cutting of metal. A brief description of the various features of the machines is presented followed by illustrations of the different machines and brief statements of the work they are designed to do.

Hack Saws.—Diamond Saw & Stamping Works, Buffalo, N. Y. Calendar hanger. Size, 12 1/2 x 20 in. The hanger is remarkably free from advertising, only the name of the company and two small engravings of its machines appearing. The pad is small in proportion to the size of the hanger, measuring approximately 5 x 6 in., but the figures, while somewhat fancy, stand out clearly.

Motor Starters.—General Electric Company, Schenectady, N. Y. Leaflet No. 68,402-2. Illustrations and descriptive matter explain the special features and operation of a line of self-starters for small direct-current motors, the special field for which they are designed being in connection with the operation of machine tools or any other similar constant-speed service. The various features of the starter are pointed out by arrows leading from an engraving of the device to a series of boxes containing the descriptive matter. Special emphasis is laid upon the safety features of the starters which are made for use with motors ranging from 1 to 3 hp. and wound for 115 and 230 volts.

Metal Working Machinery.—Hamilton Machine Tool Company, Hamilton, Ohio. Collection of bulletins. Relate to various metal working machines such as lathes and planing machines. The bulletins are identical in form, an engraving of the particular tool described being presented with brief specification tables underneath on one side and a concise description on the back. Other bulletins make mention of motor drive for the machines and the attachments that can be supplied for the lathes.

